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No. 48



THE LONDON NATURALIST

the Journal of the
LONDON NATURAL HISTORY SOCIETY

Published : August 1969

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THE LONDON NATURAL HISTORY SOCIETY

WHATEVER your interest in natural history—even if you are still a beginner—the Society will welcome you as a member. You are offered a wonderful opportunity of extending your knowledge and increasing your enjoyment. The Society's Area lies within a 20-mile radius of St. Paul's and here most of its activities take place. Although so much of the area is covered with bricks and mortar it is a most exciting region with an astonishing variety of fauna and flora. The Society consists of Sections whose meetings are open to all members without formality. If you are interested in: ARCHAEOLOGY, BOTANY, ECOLOGY, ENTOMOLOGY, GEOLOGY, MAMMAL STUDY, ORNITHOLOGY, RAMBLING, or if you are a Young Naturalist there is a section ready to help you.

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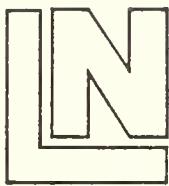
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Information about the Society may be obtained from the Membership Secretary.

Editorial

SHORTLY before going to press we received the sad news of the death, in retirement at his Dorset home, of Leonard Parmenter, past President and Honorary Vice-President of the Society. Unfortunately there was not time to prepare a full obituary for this issue of the *London Naturalist*: this will have to wait until 1970. It is fitting, however, that brief tribute should be paid here to a man who served our Society well over many years. Parmenter's last paper in this journal was published only a year ago: appropriately it was concerned with the Diptera, a group on which he had become an acknowledged expert and his knowledge of, and enthusiasm for, which are amply recorded in the pages of the *London Naturalist*. His work, and the warm memories of him, both within our Society and outside it, are his memorial: we are the poorer by his death.

Members will note two major changes in this year's *London Naturalist* —the absence of advertisements, and the increase in size over last year. For some time advertisements had proved difficult to obtain, and of no more than marginal economic value. Following on a decision of Council, the practice of carrying advertisements in the Society's journals has now been discontinued. Our sincere thanks are due to Eric Furse who for many years held the increasingly thankless office of Advertisements Secretary.

The increased size of the journal was anticipated last year. Material, however, is still in excess of space available, and once again some papers submitted for this year will have to wait until next for publication. We can only offer our apologies to the authors concerned and take comfort that the steady flow of material reflects a healthy and active Society.

“Publish or perish” was the advice once given by a University professor to the members of his Department. It is advice equally applicable to a natural history society with any pretensions to serious research. Our own Society not only publishes, but its publications are well received, a fact borne out by the several favourable comments on last year's *London Naturalist* in the national Press.

The reactions of the outside world to the *London Naturalist* and the *London Bird Report* are not without significance, for it is by these journals that we shall be judged, both by our contemporaries and by posterity; but however pleasing may be the plaudits of the crowd, they are of less long-term importance than the respect of the scientific world. It is, after all, to these pages that people turn for a record of London's natural history, and if we can continue to publish journals which endeavour to strike a balance between the more “solid” presentation of data and the articles which seek to entertain as well as inform, then we shall be, perhaps, steering successfully between our own Scylla and Charybdis. If we can do this, whilst it is no cause for conceit, at least a modest sense of satisfaction may be forgiven.

Report of the Society for 1968

THE membership figure for the Society at the end of October, 1968 was 1,729 compared with 1,709 at the same time the previous year: the fifth year in succession that the membership shows an increase over the year before. It must, however, be said that of this 1,729, unless their subscriptions are paid by the end of December, the names of 156 members will, in accordance with the rules, be removed from the register.

Exact details are not immediately available as to the number of members who may have been in a similar position in previous years, but there seems little doubt that the present position is not unique and is certainly no cause for alarm.

It is with regret that the death during the year of the following members of the Society is announced: A. R. G. Atkins, R. B. Benson, Mrs. Boyd-Watt, C. E. Bentham, G. H. Christian, Miss M. C. L. Christopher, D. G. Findlay, M. T. Hindson and W. T. Wyborn.

No less than many other organisations, in the present period of financial restriction, the Society was faced during the year with the problem of balancing its budget, and it became necessary to review the subscription with the result that a special general meeting on October 8, 1968 approved of what may have appeared at first sight to be a substantial increase, but which it is hoped with reasonable confidence will avoid the necessity for any further review of the subscription structure, at least for a few years.

The death is referred to above of Matthew Thomas Hindson, who it then became known had over a period of many years assisted the Society financially by generous donations from time to time. Under Mr. Hindson's will the Society is the recipient of what it seems clear will be a substantial bequest. Although at the time of writing this report the amount of the bequest is not known, it will probably be a sufficient sum to be considered as a capital asset rather than as a contribution to the revenue accounts.

The new secretarial structure which was set up to fill the gap in the Society's administration when Mrs. L. M. P. Small relinquished the post of General Secretary and Assistant Treasurer, and to which reference was made in the report of 1967, has been further strengthened by the formal appointment of Deputy and Assistant Secretaries. In this connection it is encouraging to note that the response to the appeal made in the last programme for volunteers to serve in the Society's administration, whilst not overwhelming, has resulted in the recruitment of able and willing helpers.

At Bookham Common, the survey and ecological work in the various disciplines which has been proceeding for some 27 years suffered a set-back by the serious illness of Mr. C. P. Castell, the Research Director and after whom, during the year, the field hut was named, "The Castell Research Centre". An immediate effect of Mr. Castell's illness was that the application for a grant from the Carnegie Trust for apparatus for soil analysis has had to be postponed. Every endeavour is being made to find a member to undertake the work, so that an application for a grant may be made early in 1969.

As a tribute to the work rendered to the Society over a period of many years by Mr. C. P. Castell, he has been made an Honorary Vice-President.

During the summer, the Administration and Finance Committee set up a small working party to explore possible means of extending the membership of the Society and the facilities to be offered.

That there is scope for some work such as this is evidenced by the fact that taking very rough figures of attendances at indoor section meetings it is revealed that only 1·5 per cent of all members registered on average avail themselves of the facilities offered; although one section has an average attendance of 12 members, another which does not give sufficient detail to arrive at a fair average, claims audiences ranging from 40 to 150.

The Council of Europe have decided that 1970 will be European Nature Conservation Year (E.C.Y.) with the aim of providing a new foundation for dealing with the effects of technological developments and demographic pressures on the countryside and to improve the quality of Europe's natural environment. To assist the Council in insuring that the Society makes its full contribution to this project as and when the details are available a small working party with fairly wide powers has been set up.

Dealing with the reports of the sections, three comment on the weather during the past summer which had some adverse effect on their programmes.

The Archeological section report on their continuing work on pottery found during the excavations at Borough High Street, "the laborious task of washing and marking the pottery" being now complete. Whilst comparatively few formal and informal meetings have been held, their report reveals that this section has been very active in the field, and referring generally to visits made to various types of buildings, the report draws attention to the fact that "the towering Victorian warehouses of Southwark are fast becoming themselves monuments of industrial archaeology."

The Botanists remark on their disappointingly low attendances, but refer to the popularity of their informal meetings, some held in conjunction with other societies. The Whitsun weekend at Bristol was an undoubted success and thanks are expressed to Drs. Willis and Martin of Bristol University and to Miss Gravestock of the Bristol Naturalists for leading a party of 26 members to see local rarities; Miss Gravestock also did much for our members in arranging the visit.

The Ecology Section refer in their report to the work at Bookham Common and appeal for the services of experienced naturalists to help newer members working on the various surveys. Mention is again made on behalf of the recorders for all members of the Society to participate in the practical work of sending in records of mammals, reptiles, amphibians, fishes and molluscs. The recorders also say that they are anxious to exchange records with other observers and societies within the area covered by this Society. That the three indoor meetings have been very successful is demonstrated by the average attendance of 60 members.

The Entomologists in the light of experience of poorly attended field meetings in previous years, organised only two this year, but have now decided to combine with other societies for future field meetings. Reference is made in their report to the "ladybird" survey launched in the spring, details of which have been widely circulated.

However much a warm but wet summer may inconvenience, indeed

hamper, the work of other naturalists, it is pleasant to read that a well-attended fungus meeting, an innovation organised in August by the Epping Forest Field section, because of these very circumstances, noted many varied specimens, and the section is encouraged to repeat a similar meeting next year. In their report, the section refers to the resignation of Miss B. Cornwall from their committee and pays tribute to the many years support and the advice she has given.

The Ornithologists in addition to a series of consistently well-attended informal meetings have held ten formal meetings and three social functions, one of which, a buffet supper, was held after a joint meeting with the B.T.O.

The annual dinner, again held at the Rembrandt Rooms in April, was a success, the guests of honour being Dr. and Mrs. Bruce Campbell.

One of the regular complaints from the Research Sub-Committee is that the enquiries are generally so poorly supported that the organiser is left to carry out most of the field-work alone. It is, therefore, encouraging to report that there was a much greater participation in 1968. Most of this support was given to the Atlas Project, but other surveys are still in need of further help.

The Black Redstart enquiry is continuing. The breeding distribution of this species is not fully known and pairs may often be located around industrial sites in densely built-up areas, where there may be a preference for high buildings which can be used as song-posts. The organiser would welcome further information, including negative reports, and there is a special request for help in the Park Royal to Paddington area and along the Kent side of the river. Many sites appear to be used for only one year, and all records that might throw more light on this aspect of their breeding distribution would be useful.

John Gooders would be glad to receive records of the breeding of the House Martin in Inner London and a new enquiry, to be organised by Bryan Sage, concerns the roosting movements of gulls, particularly in the area around London Airport. The possible dangers arising from large numbers of gulls flying into roosts across aircraft approach routes has not previously been investigated and this Society can provide valuable information on numbers and flight-lines of gulls roosting at the London reservoirs. Offers of help should be addressed to the organiser.

The major research programme started in 1968 has been the Atlas Project. Over a period of about five years this Section is aiming to map the summer distribution of all breeding species in the London Area.

If there is one section in which every member of the Society could find interest it is assuredly the Ramblers. Although far outside the Society's area of normal operations, one must be interested in natural history in Australia or a talk about East Africa. Nearer home and within our "area", apart from fascinating buildings commonly open to the public, a special tour of the private rooms of the Royal Academy must offer some considerable fascination. One could be forgiven for sometimes wondering why this is not the most popular section.

The South West Middlesex Section reporting a slight drop in both indoor and outdoor meetings is a section which can attribute this position to the indifferent summer, many of their evening meetings being affected by bad weather. Certainly, the programme arranged offered much attraction. This section is a member of the Hounslow Council for Arts and is represented on the Committee.

The meetings of the Geology Section were in general well attended this year. Unfortunately there was no Easter field meeting, but early in the year there were two very successful field meetings by coach, one to West Sussex for the Coastal Tertiaries; the other to Barton-on-Sea for Upper Eocene fossils. In addition to a number of other field meetings with very practical aims, there were a number of interesting and entertaining indoor meetings touching on such subjects as Icelandic geology and a demonstration of minerals, maps, fossils and rocks with particular reference to the teaching of the G.C.E. "A" level practical course.

Botanical Records for 1968

Compiled by J. EDWARD LOUSLEY

THE London Area in 1967 again suffered a depressingly dull, cool, wet summer, when overcast skies were the rule rather than the exception. At St. James's the rainfall for the year totalled 30.02 inches—128% of the average. Several storms were of exceptional severity and especially those of September 14th-15th when, for example, $7\frac{1}{2}$ inches of rain fell in the two days at Edenbridge, only four miles outside our boundary. The effects of the wet summer were especially noticeable in the case of aquatics where species requiring exposed mud had no suitable habitat, while those growing in water failed to flower on account of inability to struggle to the surface in water too deep to warm up to the necessary temperature.

Once again London botanists have shown that they are not easily put off by the weather and useful additions have been made to our records. One of outstanding interest is the discovery by H. M. Pratt of *Eryngium campestre*, a relation of the Sea Holly, in chalk grassland near Dartford. This is the first time this rare native species has been recorded from the London Area though it grew formerly in a similar habitat at Wrotham Hill, Kent only a short distance outside our boundary. Of special interest also are the numerous much-needed additions to our North Essex records made by Miss M. E. Kennedy with the assistance of D. H. Kent. These have filled many gaps for this under-recorded vice-county.

In this report "Tetrad" references, as used in the Mapping Scheme, are cited where available, and failing this, 10-kilometer squares of the National Grid. In both cases these appear in brackets following the place names. The nomenclature is based on the *List of British Vascular Plants* (1958) prepared by J. E. Dandy, and for species in that *List* authors' names are omitted to save space.

V.-c. 16, WEST KENT

Mr. H. M. Pratt's important discovery of *Eryngium campestre* has already been mentioned. About forty stems growing with characteristic native chalk grassland species were found in July in the grounds of a hospital near Dartford (57/T.62) and were still in flower in September when he showed it to me and Mrs. J. E. Smith. R. M. Burton reported *Artemisia absinthium*, Wormwood, from a building site near Greenwich (37/T.86). This species is common in many parts of our Area, but appears to be rare in Kent. Mr. Burton also found *Potentilla norvegica* in a former coal yard at Sidcup Station (47/T62) for which we have no previous records from the vice-county. J. R. Palmer and John Mason report a number of interesting aliens from refuse tips near Dartford (57/T44 and 57/T64) and these include *Rumex triangulivalvis* (from 57/T64) which now seems to be established near the Thames a little higher up in Surrey and Middlesex. In 1957 *Ornithopus compressus* was found on the sandy verge of A.20 Ruxley (46/T88?) and persisted for some years until accidentally exterminated. In 1967 it was reintroduced from seed of plants grown from here by D. McClintock (*Bull. Kent F. C.*, 14, p. 51), and in April 1968 J. R. Palmer reported that it was there in quantity.

V.-c. 17, SURREY

A useful list of plants from Burwood Park (06/T80) was provided by Mrs. J. E. Smith and Anthony Wilson. This included *Neottia nidus-avis* and other orchids, *Ranunculus lenormandi*, *Carex curta*, and large colonies of *Iris versicolor* round Manor Pond—the last three confirmed by Dr. D. P. Young. B. R. Radcliffe, who is making a detailed study of the Epsom Downs area, found a single plant of *Galeopsis speciosa* near Langley Bottom Road in 1967 and a little way away it was in "great abundance" in 1968 (25/T08). On Walton Heath (25/T24) he found one small fruiting tree of *Amelanchier confusa*. In recent years this has been spreading rapidly from bird-sown seed in southern England and records for our Area have been coming in fast and are very welcome. H. Britten has sent in some useful additions to the plants he recorded before he moved away some ten years ago and he tells me that R. O. Britten saw a "number of good flowering specimens" of *Lilium martagon* in 1968 in Smith's Wood, Woodcote (26/T80), where he showed it to me in 1952, and it has since been threatened by the proximity of a new housing estate.

Coming from so near the centre of London, an interesting report is "lots" of *Plantago coronopus* from by the Surrey Canal at Rotherhithe (37/T48) sent in by R. M. Burton. On Ditton Common (51/T46) William Mackintosh found several clumps of Star of Bethlehem, *Ornithogalum umbellatum*, and he also found one plant in a gravelly hollow on Barnes Common (27/T24). At Warwick Wold (35/T02) J. R. Palmer noted a bush of *Crataegus crus-galli* apparently bird-sown, and a single plant of Autumn Crocus, *Colchicum autumnale* in a copse at Chelsham (35/T88) to which he was directed by R. Clarke. *Sorghum halepense* (L.) Pers. is an alien grass which is usually of very temporary appearance in Britain but on rough ground near Morden (26/T26) J. R. Palmer and E. Clement found a good patch with many rhizomes which was apparently established. From the vicinity of Kenley (55/T28) Dr. D. P. Young reports the rare

orchid *Epipactis phyllanthes*, which we now know from six localities in the London Area.

V.-c. 18 SOUTH ESSEX

A single plant of *Lavatera trimestris* L. was found by Mrs. L. M. P. Small in a beetroot field at Rainham (58/T44).

V.-c. 19, NORTH ESSEX

Thanks to the efforts of Miss M. E. Kennedy and D. H. Kent many additions were made this year to this neglected part of our Area; only a few of the more important can be mentioned here. *Stellaria pallida* from Claverhambury Farm (40/T02), *Ranunculus circinatus* from a gravel pit at Lower Nazeing (30/T86), *Trifolium arvense* from Tye Green (40/T48), *Hippuris vulgaris* from Waltham Abbey (30/T80) and Lower Nazeing (30/T86) and *x Festulolium loliaceum* from Magdalen Laver (50/T06) were all found by Miss Kennedy and confirmed by D. H. Kent. At Latton Park (40/T66) Miss Kennedy and P. C. Holland found *Calamagrostis epigejos*, and in a gravel pit at Fisher's Green (30/T62) D. H. Kent found *Cyperus eragrostis* Lam. *Artemisia verlotorum*, of which we have been recording the spread with great interest, was found by Miss Kennedy near North Weald (30/T04), in a gravel-pit at Fisher's Green (30/T62) and in a gravel-pit at Lower Nazeing (30/T86).

V.-c. 20, HERTS.

In the course of tetrad-recording E. B. Bangerter added considerably to our records, including a good many additions to the distribution shown in Dr. Dony's *Flora of Hertfordshire*. Most of the species concerned are fairly common in our Area generally. They include *Soleirolia soleirolii*, which is very much a churchyard plant, from the churchyard wall at Bayford (30/T08), *Symphytum orientale* from Cuffley (30/T02) and *Sorbus torminalis* from a woodland area at East Barnet (29/T84). The last mentioned has also been found by Miss M. E. Kennedy at Appleby Street (30/T24).

V.-c. 21, MIDDLESEX

Mrs. J. McLean found a very large form of *Brachypodium pinnatum* (det. C. E. Hubbard) on a railway bank at North Acton (28/T00) where it was probably sown. This is only the third Middlesex record for this chalkland grass. On a heap of shingle at West Acton Station (18/T80) she found *Digitaria sanguinalis* and *Setaria glauca* (L.) Beauv. (both det. Dr. N. L. Bor) in abundance. On the floor of a disused reservoir at Ealing (18/T80) she recorded *Sorbaria sorbifolia* (L.) A. Br. as established, and, with E. Clement, in the same reservoir (19/T80 and 18/T82) *Calamagrostis epigejos*. The Great Burnet, *Sanguisorba officinalis* is very much a Middlesex plant with us, and the discovery by Dr. Mary Roebuck of a single plant by the edge of a footpath at Stanmore (19/T60) where she has seen it for the last four years, is a useful extension of range. Mrs. Small and family examined the disused railway at Uxbridge (08/T40) where they found *Verbascum blattaria* and *Linaria repens*, and on Hounslow Heath (17/T24) they collected a very pale form of *Cyperus longus* (conf. Miss S. S. Hooper) as an adventive.

D. H. Kent reports a few plants of *Bromus arvensis* by the canal path south of Uxbridge (08/T40). This is our first record of this rare grass

for 50 years. In a small pond in the grounds of Clayponds Hospital, South Ealing (17/T82) he noted *Lagarosiphon major*. On the river wall at Hampton Court (16/T66), R. M. Burton and E. Clement noted a plant of *Acer negundo* L. about four feet tall and in fruit.

V.-c. 24, BUCKS.

No records received.

We are grateful to the following for their contributions to our records during the year:—

Ian Aberdeen, *E. B. Bangerter, Dr. N. L. Bor, Miss L. F. Bowden, *H. Britten, *R. M. Burton, R. Clarke, *E. Clement, Miss B. Hewson, P. C. Holland, F. J. Holroyde, L. Holyday, Miss S. S. Hooper, Dr. C. E. Hubbard, A. C. Jermy, *Miss M. E. Kennedy, *D. H. Kent, J. E. Lousley, D. McClintock, William Macintosh, Mrs. J. McLean, Dr. A. Melderis, Miss B. M. C. Morgan, P. A. Moxey, *A. F. M. and Mrs. B. S. Mussell-white, *J. R. Palmer, *H. M. Pratt, *B. R. Radcliffe, Dr. Mary Roebuck, Dr. F. Rose, B. T. Ryves, Mrs. L. M. P. Small, *Mrs. J. E. Smith, L. K. Wilkinson, *B. Wurzell, Dr. D. P. Young. Those who have contributed lists are marked with an asterisk.

Plant Mapping Scheme

Progress Report for 1967/1968

THIS report covers two years as circumstances prevented the preparation of a report in time for last year's *London Naturalist*. Considerable progress has been made since 1966, as can be seen from the accompanying map, although there still remains a great deal to be done before we can begin publishing distribution maps. Nearly 60 per cent of the tetrads in our area have been visited on at least one occasion; a few of them have received many visits. The highest number of species (539) has been recorded in the Harefield tetrad (09/T40) in Middlesex (V.-c. 21), where a diversity of soils and habitats, together with several interesting rubbish tips, has provided interesting plants.

Although only about one third of the tetrads wholly or partly in the London area section of Herts. (V.-c.20) have been recorded, some 400 additions have been accepted by Dr. John Dony to the "minimaps" in his *Flora of Hertfordshire*. This shows the value of our scheme and underlines the fact that we can add to the knowledge of plant distribution, even in those counties which have already been mapped.

The following table shows the position of the counties as at the end of 1968, as well as the position overall. We estimate that there are about 290 tetrads which are crossed by a vice-county boundary. As far as possible, separate cards are being kept for each of the vice-counties in

these squares and this explains some of the apparent anomalies in the figures. For instance, the seven tetrads listed as unrecorded for Bucks. have all been examined, some of them very thoroughly, on the Middlesex side.

		TABLE						
		LNHS	Kent	Surrey	Essex	Herts.	Middx.	Bucks.
Tetrads with:								
0	species recorded	345	58	114	133	98	—	7
1-50	„	33	7	26	5	2	2	1
51-100	„	45	14	17	13	7	12	1
101-150	„	110	31	22	32	17	12	7
151-200	„	168	24	12	13	15	102	9
201-250	„	58	13	10	6	8	24	1
251-300	„	75	7	11	1	3	58	1
301-350	„	11	2	1	—	1	7	1
351-400	„	8	—	—	—	—	8	—
over 400	„	3	—	—	—	—	3	—
Total number of tetrads visited		856	156	213	203	151	228	28

An idea of the general areas still most in need of attention can be gained from the map. A rather more detailed review of the counties follows.

KENT (V.-c. 16)

The totally unworked tetrads are mainly, but not entirely, in built-up areas and are located in and near West Wickham, Beckenham, Bromley, Orpington, Eltham, Woolwich, Belvedere, Welling, Knockholt, Halstead, Cudham, Dunton Green and north and north-west of Westerham.

SURREY (V.-c. 17)

The few well-worked tetrads are in the areas of Richmond, Wimbledon, Ewell and Epsom. The most poorly recorded areas are the Malden-Croydon-Merstham triangle, the extreme west in the Weybridge area and in the south between Reigate and Caterham.

ESSEX (V.-c.'s 18 and 19)

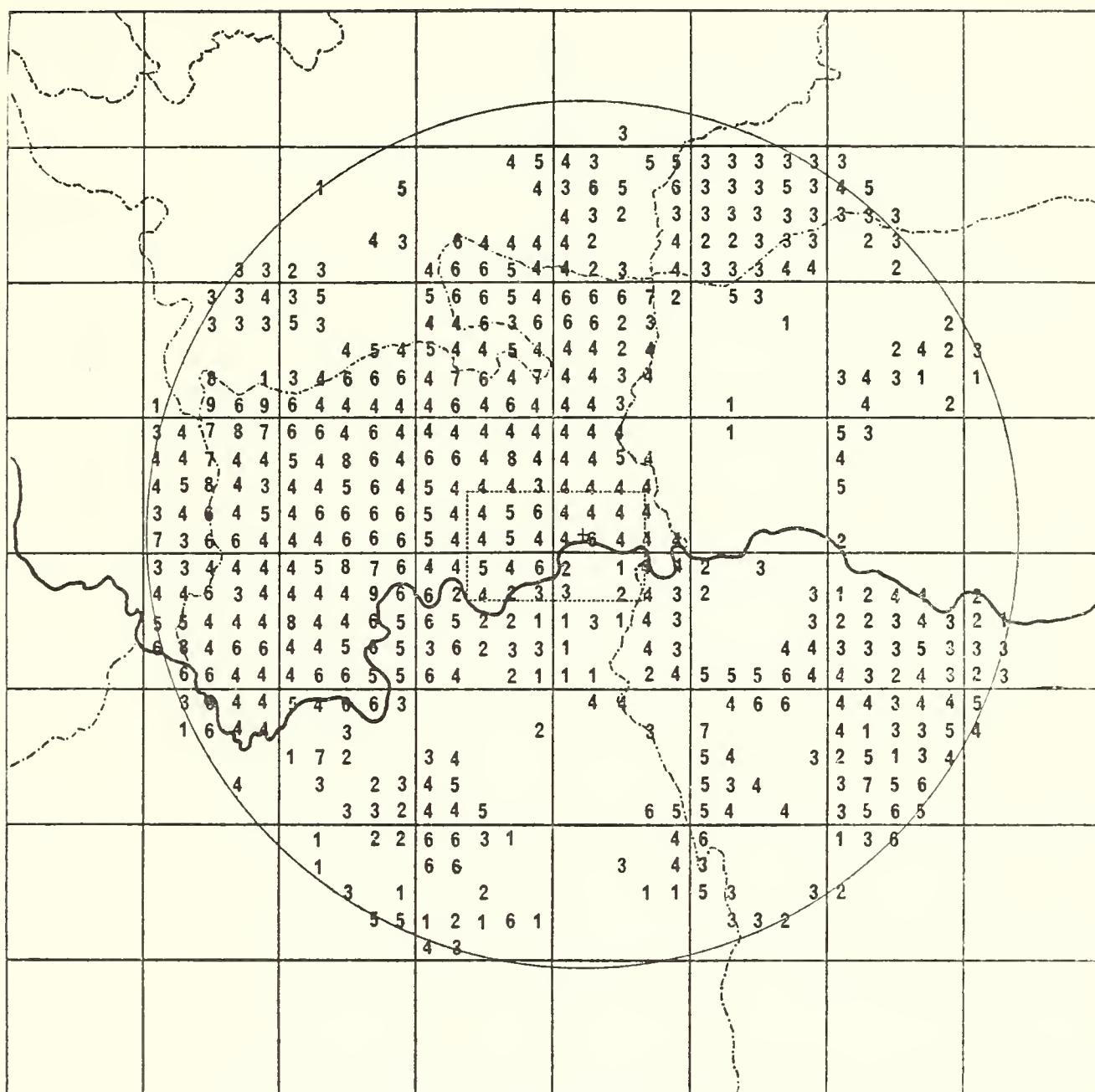
The two vice-counties are dealt with together, as separate cards have not been kept in this case. Most of the tetrads in the north of the county have been visited on one or two occasions, only seven squares are still untouched here. One of these (30/T60) has the unique distinction of being shared by four vice-counties (V.-c.'s 18, 19, 20 and 21). Practically all the squares for which we have cards in South Essex are to be found around Dagenham and northwards through Romford to Havering-atte-Bower and thence eastwards to Brentwood. Nearly all these squares need further visits and members starting work in any other part of the county would be breaking new ground.

HERTS. (V.-c. 20)

Most of the squares worked so far are to be found to the north and north-west of Watford, around Barnet and from Cuffley and Northaw northwards to Essendon, Bayford and Hoddesdon. Work is particularly wanted around Rickmansworth, St. Albans, Hatfield, eastwards of Watford and south of Hertford.

MIDDLESEX (V.-c. 21)

Although by far the best worked county, all tetrads now having been visited on at least two occasions, much work remains to be done in the



KEY

1 = up to 50 species recorded	5 = up to 250 species recorded
2 = up to 100 species recorded	6 = up to 300 species recorded
3 = up to 150 species recorded	7 = up to 350 species recorded
4 = up to 200 species recorded	8 = up to 400 species recorded
9 = over 400 species recorded	

inner suburbs of London, e.g., Camden Town, Kentish Town, Hackney and Wood Green.

BUCKS. (V.-c. 24)

Twenty-one of the 28 tetrads wholly or partly within our area have been visited, but most squares need further visits and more contributors would be welcome, as indeed they would for the whole area of the survey.

It is noticeable, and by no means surprising, that certain groups of plants such as grasses, sedges (*Carex*) and willow-herbs (*Epilobium*) are under-recorded, some cards having complete blanks for one or other of these groups. Perhaps recorders who are, very wisely, cautious when they are not 100 per cent certain could submit specimens to one of the

V.-c. Recorders for positive identification, so that their cards can be as complete as possible.

In conclusion, the writer would like to thank all those members who have already made contributions to the records, to appeal for more and still more records from everybody and to thank the Vice-county Recorders for their help in the compilation of this report.

P. C. HOLLAND

Seasonal changes in the phytoplankton of St. James's Park Lake, London

By B. A. WHITTON

(*Department of Botany, University of Durham*)

THERE have been few detailed studies of seasonal changes in the phytoplankton of small productive lakes in Britain. Preliminary observations on the phytoplankton of the lake in St. James's Park, London, indicated that it had an interesting flora, and so regular sampling was carried out between May 1964 and January 1968. The results are presented here in some detail in the hope that other workers living near the lake will develop new studies on it. As pointed out by Pentelow (1965), this must be one of the most public sheets of water in the world. Further, there are seven university botany departments within a radius of 10 km of the lake, and the lake would provide relatively dense populations of a wide range of plankton organisms at all seasons of the year suitable for teaching in schools and colleges.

The lake is a shallow, eutrophic body of water in the centre of London. An account of its history and general ecology has been given by Pentelow (1965) and an introduction to the phytoplankton flora by Whitton (1966). Analysis of water taken on January 8, 1968, showed: Ca^{++} , 101 mg/l; Na^{+} , 90 mg/l; Cl^{-} , 133 mg/l; conductivity, 1.18×10^3 micro-mhos. There is no submerged moss or angiosperm vegetation. Algal growths occur on the cement sides and also, in winter at least, on the cemented bottom in certain shallow parts.

METHODS

Occasional samples were taken from the lake during the summers of 1961 and 1962 as described by Whitton (1966). Regular sampling of the lake was made at two-week intervals from May 1964 until January 1968, the collections usually being made early on a Tuesday afternoon. They were taken from the Whitehall (eastern) end of the lake on the north side, where the footpath runs next to the water. The samples were taken by opening a bottle 10 cm below the water surface. Part of the material was

preserved with Lugol's iodine. The fresh and preserved samples were posted to the author, and in the majority of cases the fresh samples were viewed within 24 hours of collection. As the samples were not taken from a whole water column this simple method of sampling can not always be regarded as reasonably representative of the whole lake. However, obvious aggregation of algae near the water surface was noted for only one species, *Oscillatoria agardhii*. A more detailed sampling of the lake was made on two occasions during a bloom of *Oscillatoria redekei*, the main organism in the lake during much of the period under study. Samples were taken from various sites and depths, and the distribution of this organism was on each occasion found to be relatively uniform.

Counts of the plankton were made using a 0.2 mm depth haemacytometer. A total volume of 0.029 ml was scanned for each sample; that is, a total count of only 1 cell would correspond (on the average) to a density of 35 cells/ml. All individuals were counted, with the exception that counts of any one species exceeding 100 were completed at this value, and the volume occupied by this number then noted. Further scanning without counting was made in order to note a few further species present at densities too low to be included in the haemacytometer counts. Such forms have been listed with an arbitrary density of 5 cells/ml in the figures to distinguish this situation from the one where none at all were seen.

In the notes below, a particular sample date is referred to by the number of the sample in any particular year together with the year. For instance, 12/64 refers to the 12th sample in 1964. The actual dates are as follows:

Sample	1964	1965		1966		1967		1968	
1		January	5	January	4	January	4	January	8
2			19		18		18		
3		February	2	February	1	February	1		
4			16		15		14		
5		March	2	March	1		28		
6			16		15	March	13		
7			30		29	April	4		
8		April	13	April	12		18		
9			27		26	May	3		
10		May	11	May	10		17		
11	May	26	25		25		31		
12	June	9	June	8	June	9	—		
13		23		22		19	June	19	
14	July	7	July	6	July	6	July	4	
15		21		20		19		18	
16	August	4	August	3	August	2	August	1	
17		18		17		16		16	
18	September	1		31		30		29	
19		15	September	14	September	13	September	19	
20		29		28		28		26	
21	October	13	October	12	October	18	October	15	
22		27		26		25		25	
23	November	11	November	9	November	8	November	7	
24		25		23		22		21	
25	December	12	December	7	December	3	December	5	
26		22		22		20		20	

INFORMATION SUPPLIED BY MINISTRY OF PUBLIC BUILDINGS AND WORKS

Certain records are kept by the Ministry, and the following information was kindly made available by Mr. A. G. Alston.

Draining and cleaning

The whole lake was drained and cleaned in January 1964, four months before the commencement of the fortnightly sampling. It was drained and cleaned again in 1966 (Jan. 20-Feb. 3), but this time at the eastern end only.

Ice

The whole lake was noted to be frozen at the surface on Jan. 20, 1966. It was partially frozen on: March 3, 1965; Jan. 20, 1966; Jan. 5, 1967; Dec. 5, 1967; Jan. 11, 1968.

Sprays

Sprays were installed at the western end on Aug. 8, 1966. These are fed from a borehole supply, and are in operation from 1100-1600 hrs. each day.

Temperature

Weekly temperature measurements were taken during the first half of 1968. The monthly averages are:

Jan., 3.3°; Feb., 5.6°; March, 6.2°; April, 9.4°; May, 14.7°; June, 17.0°.
(All in degrees Celsius).

Dissolved oxygen

Dissolved oxygen values were recorded from a number of sites in the lake at the same time as the above temperatures. As they were taken only at one time of day (approximately mid-day), they are not given in detail. The results indicate that the water was usually slightly super-saturated with oxygen at this time of day, and was seldom much below saturation.

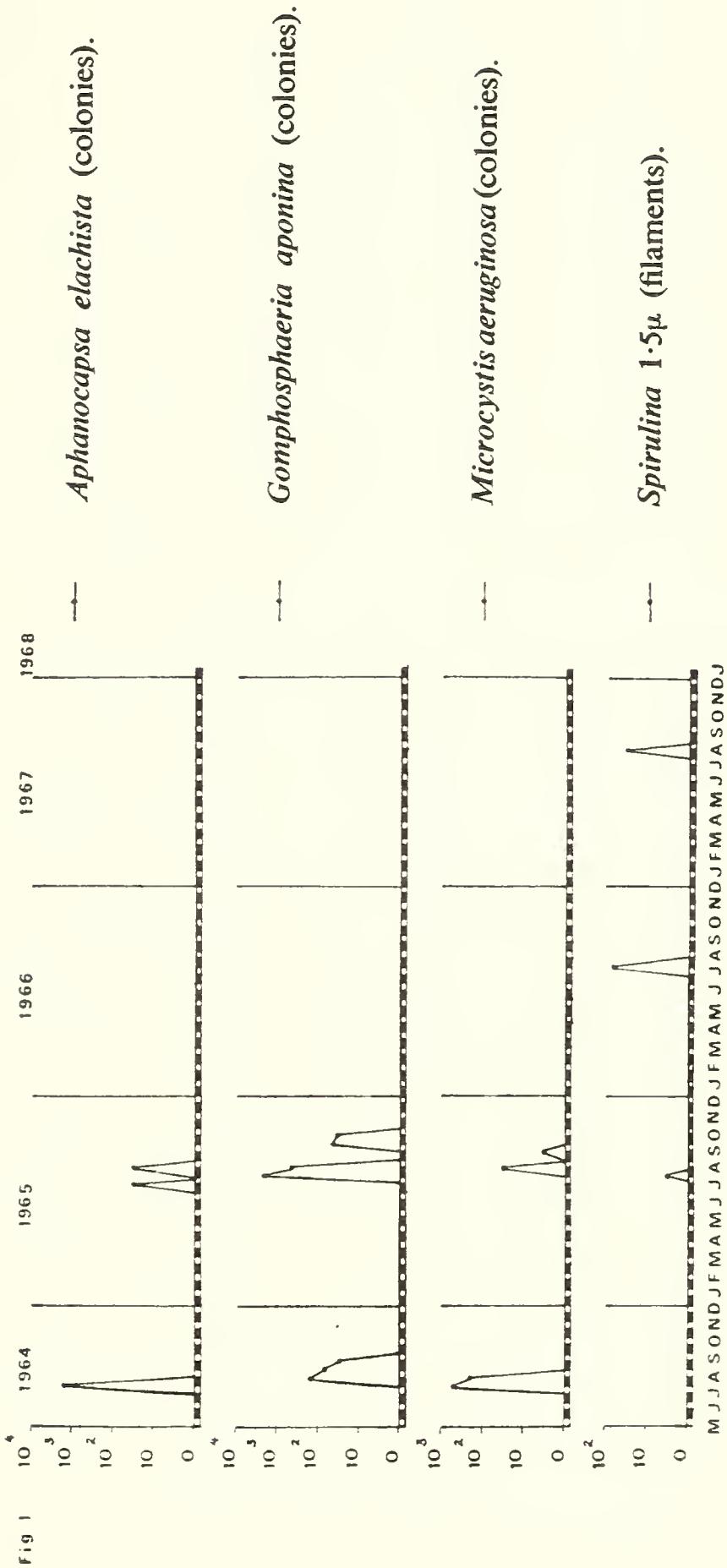
RESULTS

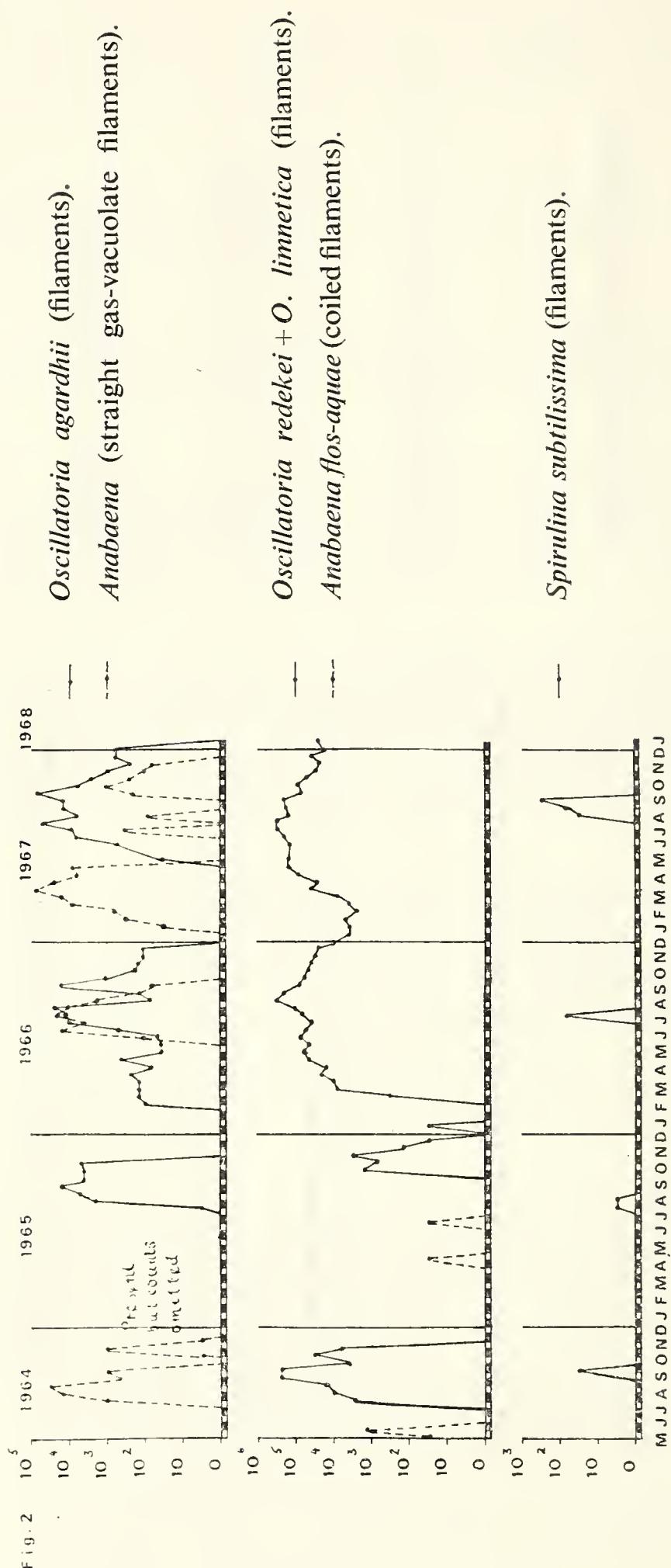
The seasonal distribution of the most important species is shown graphically (Figs. 1-14) whilst the occurrence of other organisms is summarized in note form. Only the most abundant species of diatoms are recorded. Many others occurred occasionally and some are listed in Whittow (1966). These were in most cases probably epilithic or epiphytic species washed into the plankton in windy weather.

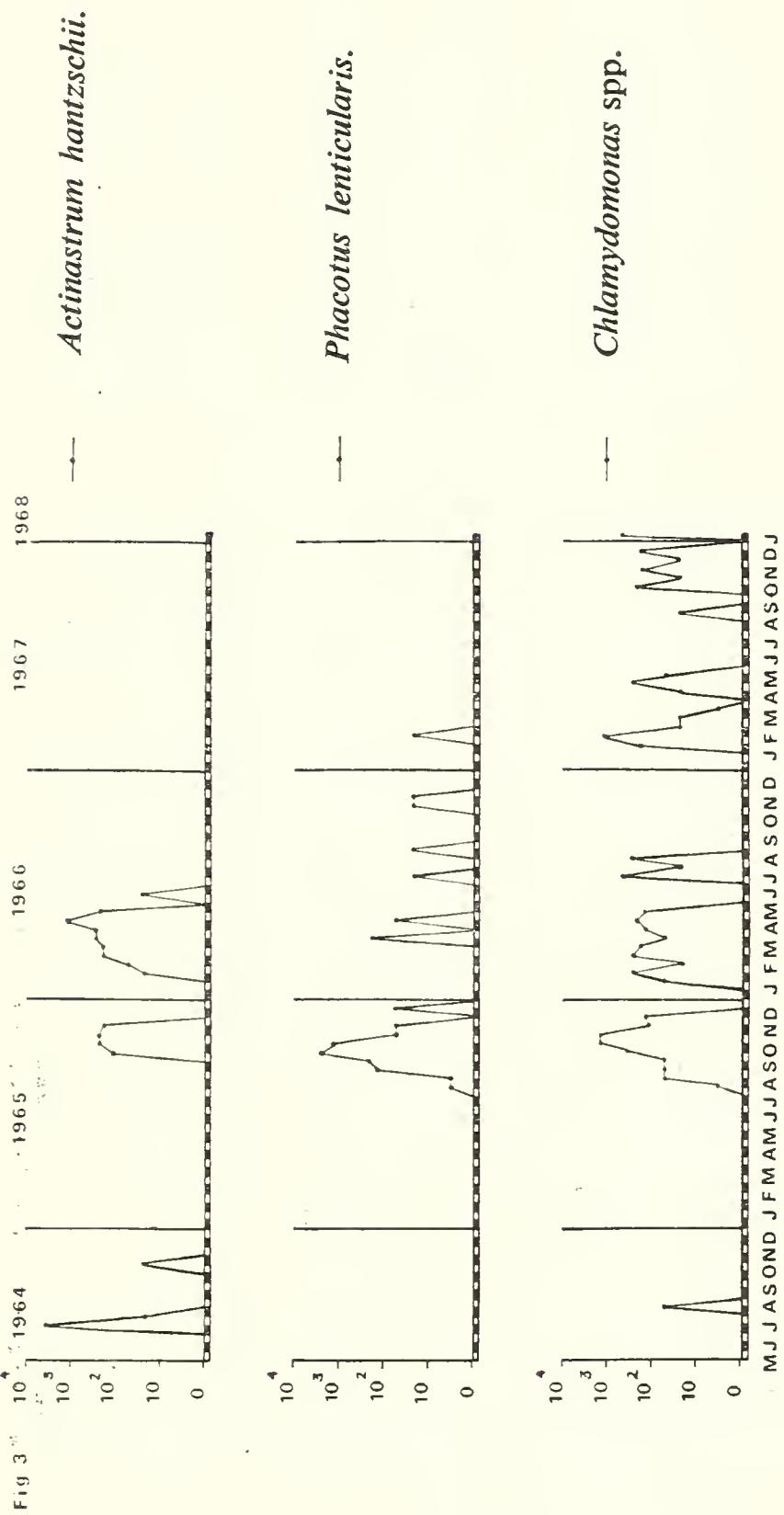
The most characteristic algae are illustrated in Fig. 15 (a-e) and some unusual forms in Fig. 15 (f-i).

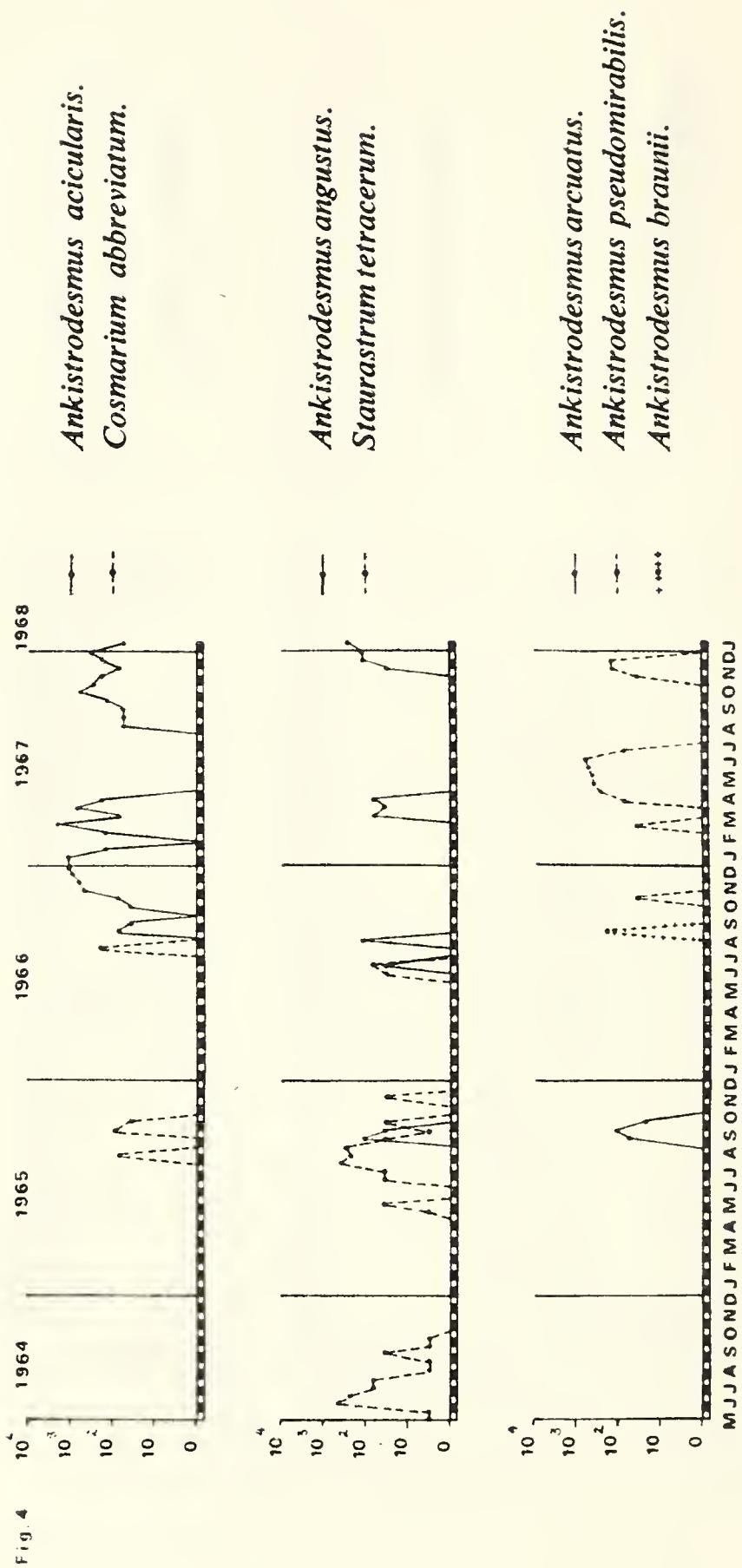
MYXOPHYTA

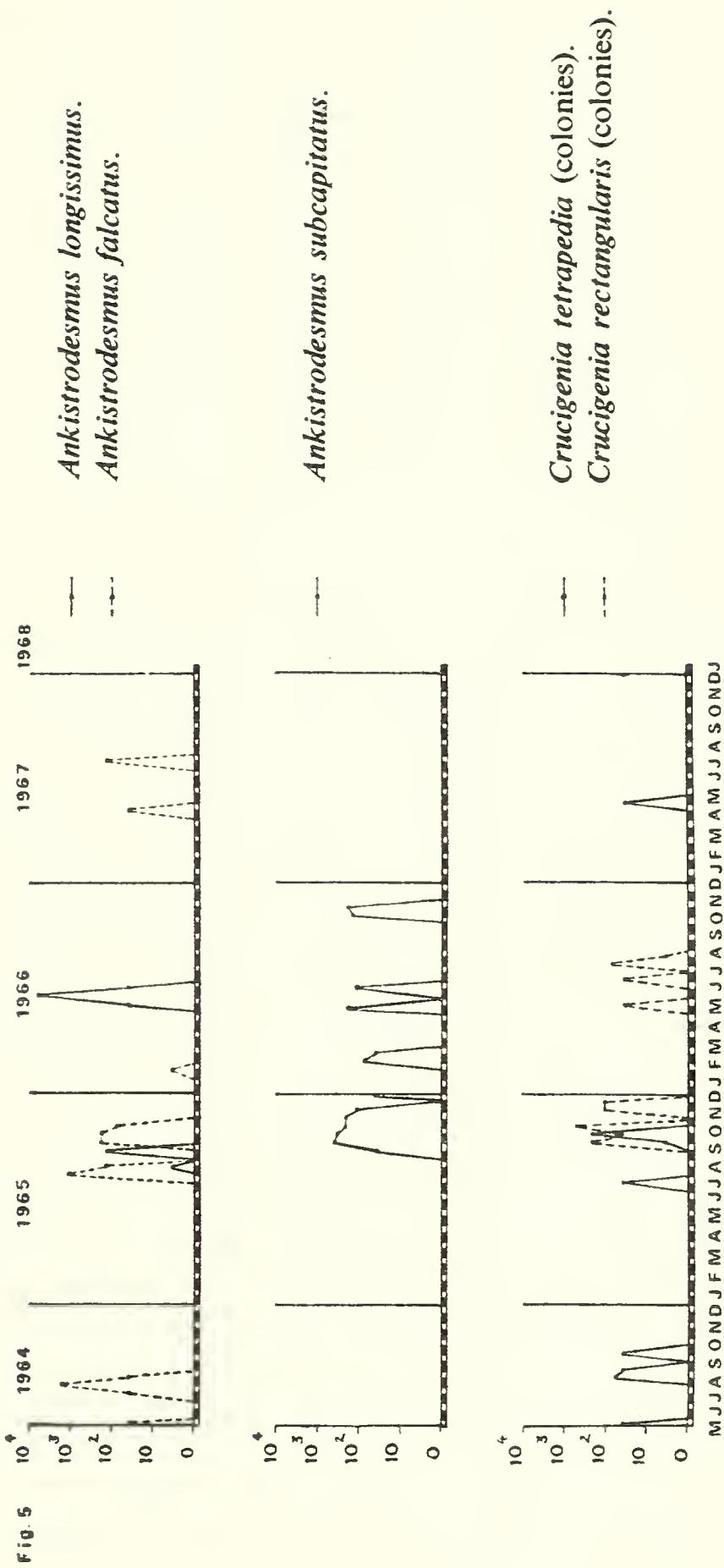
Anabaena. Gas-vacuolate *Anabaena* filaments about 4 μ wide were often an important component of the plankton (Fig. 2). Their taxonomy however did not prove easy. The coiled filaments typical of *A. flos-aquae* (Lyngb.) Bréb. were noted only a few times (Fig. 2); spores of this material were not seen. All other gas-vacuolate filaments seen were of similar width, but quite straight. Both coiled and straight forms were present in sample 16/64, indicating the probability of at least two distinct strains being involved. The straight forms formed four main bursts during the period under study, not all at the same season of the year (Fig. 2). In each case filaments were noted first without heterocysts, then later with heterocysts, and finally mostly with spores and heterocysts. The spores were mostly distant from the heterocysts, usually straight, though occasionally curved, reaching lengths of 30 μ . The material could perhaps be referred to an *A. aequalis* Borge with gas-vacuoles. However, the author considers that

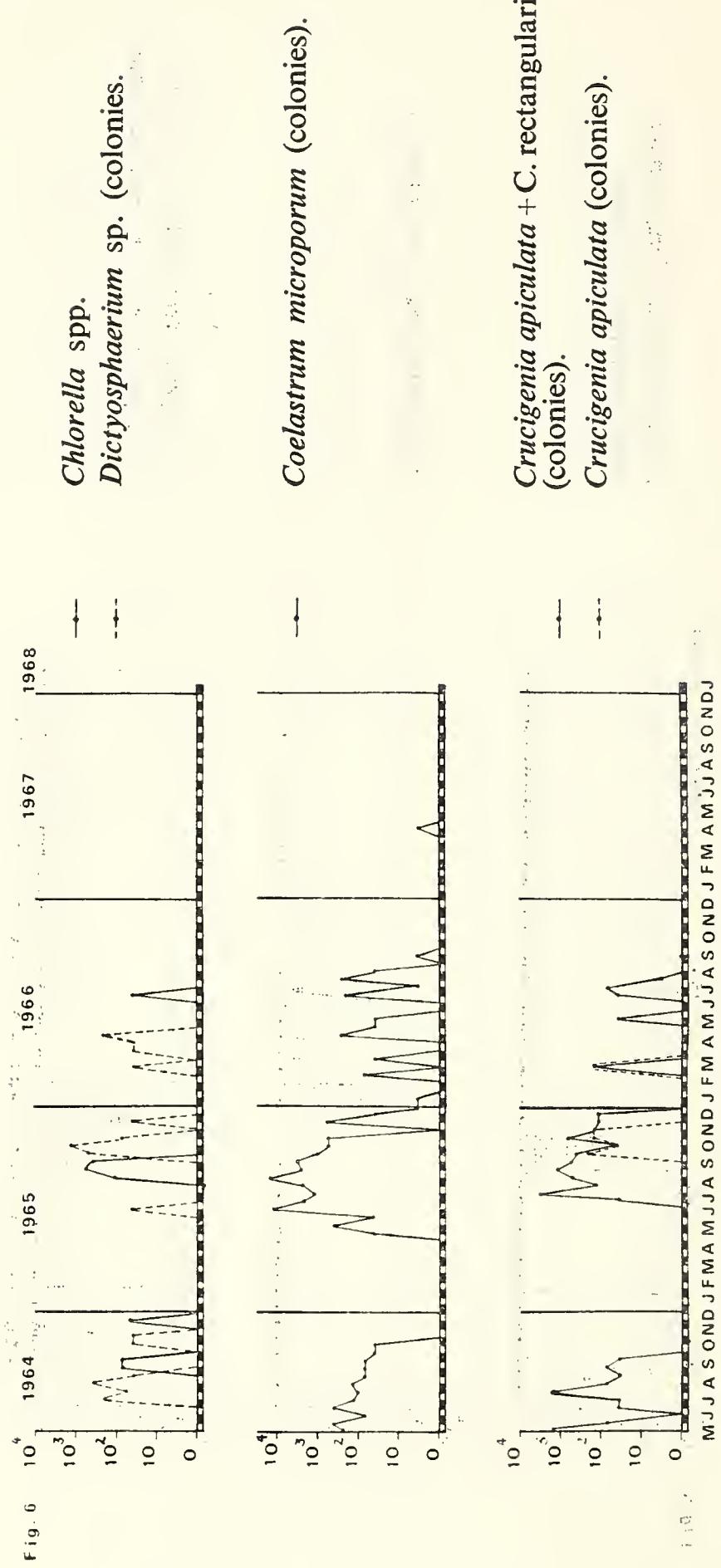


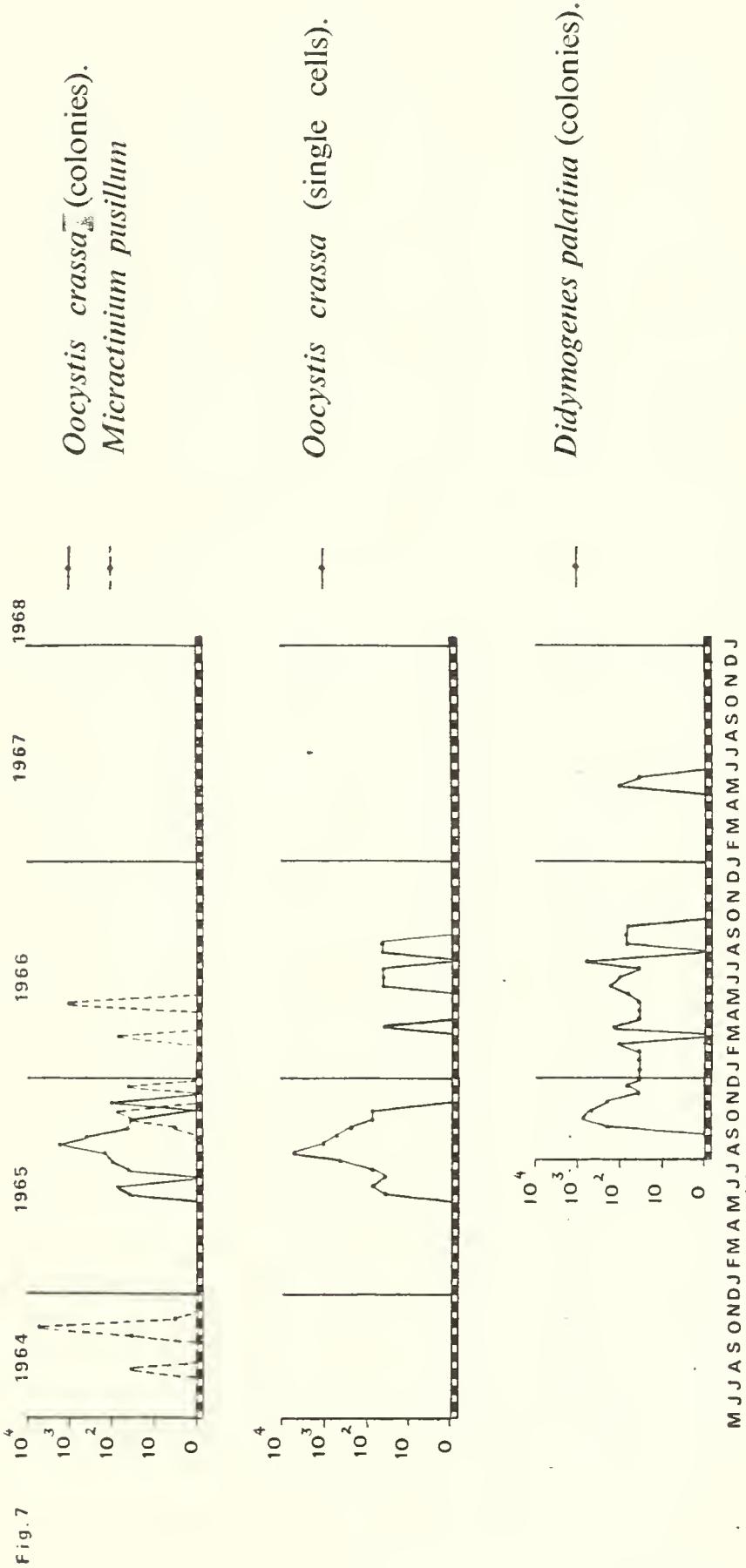












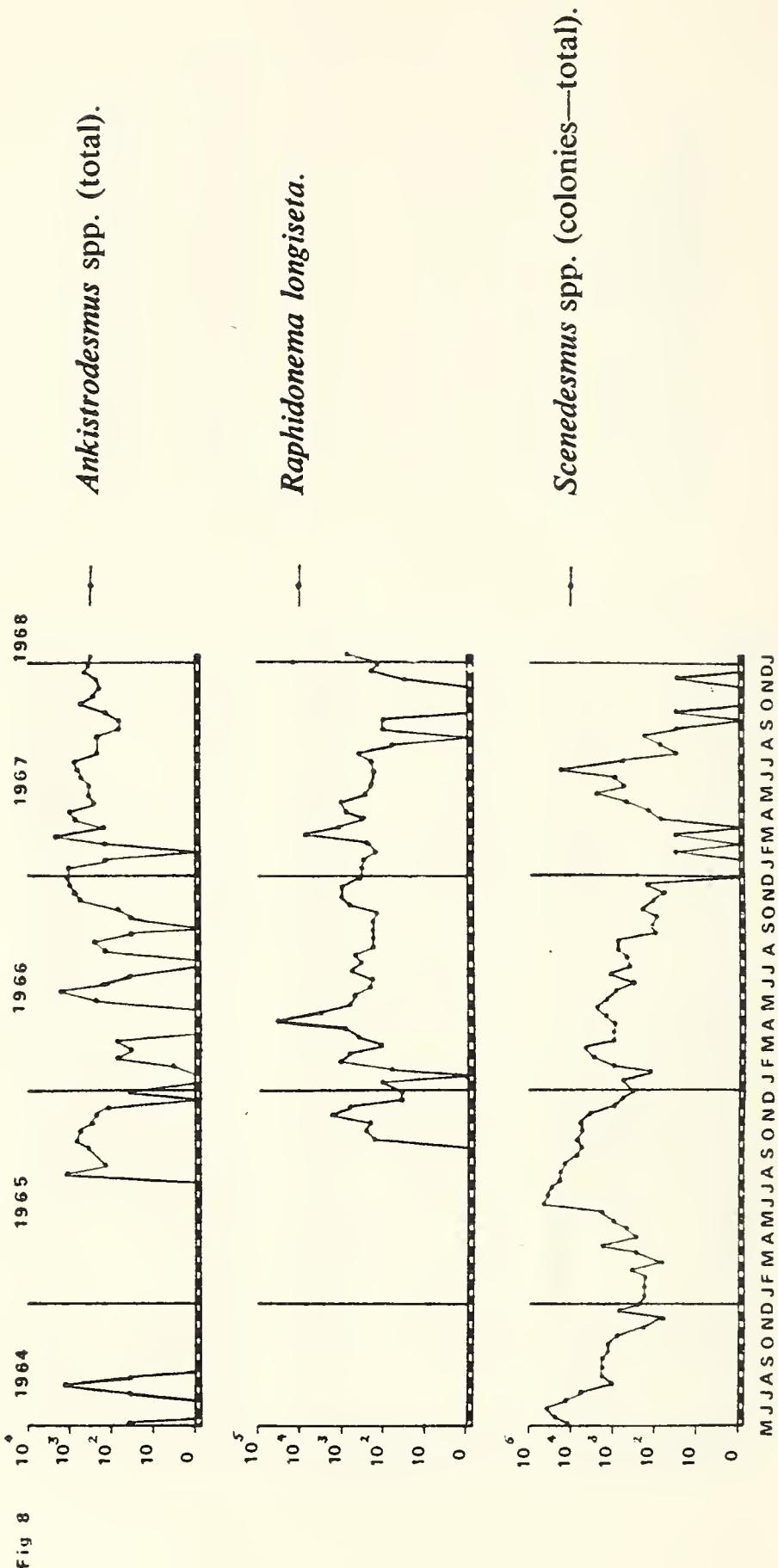
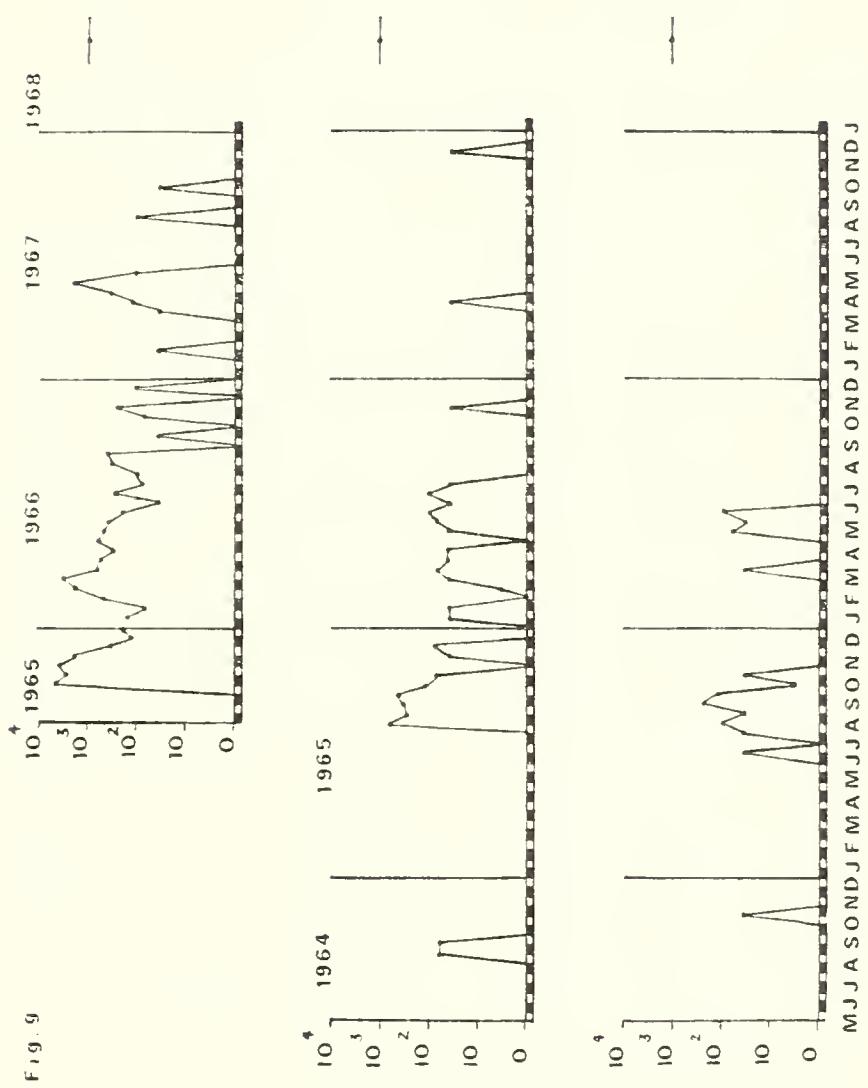


Fig. 9
Scenedesmus acuminatus type + var.
biseriatus (colonies).



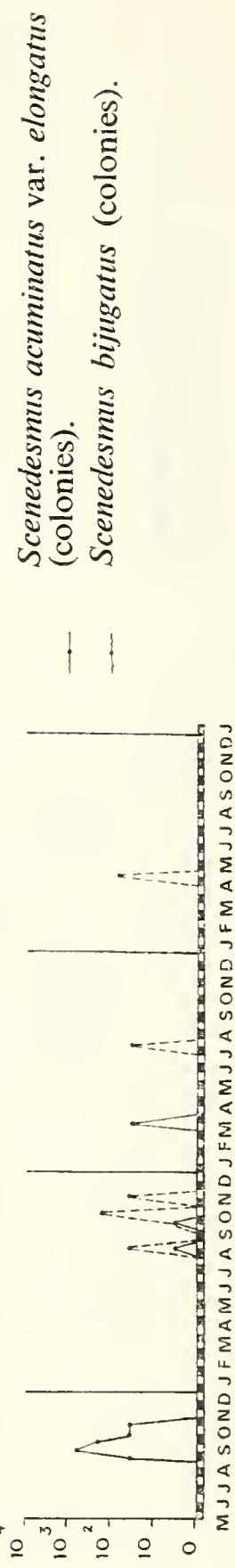
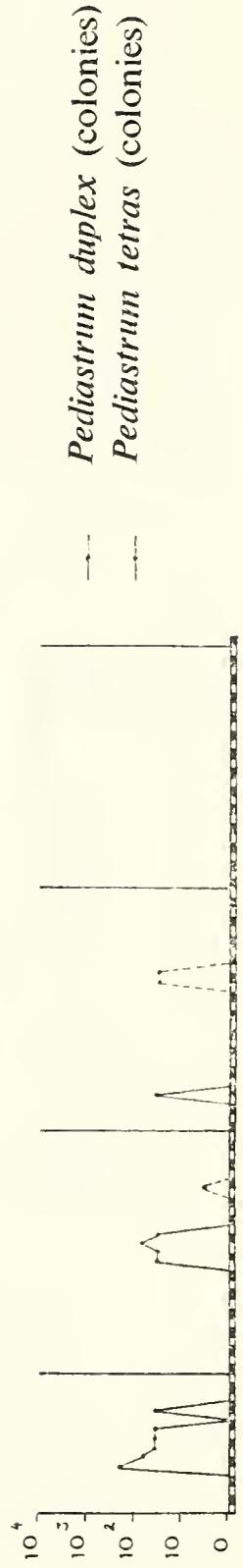
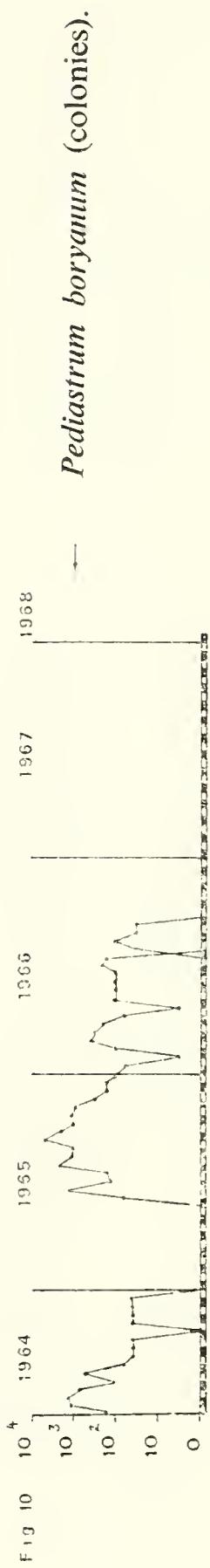
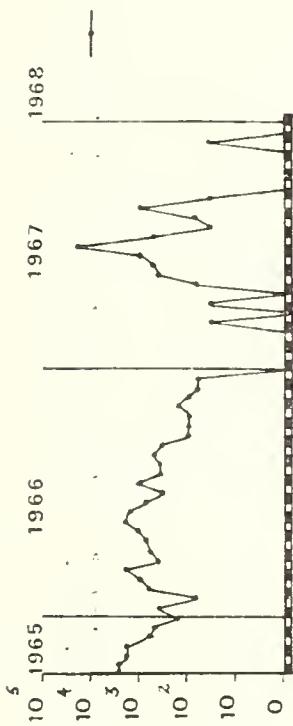
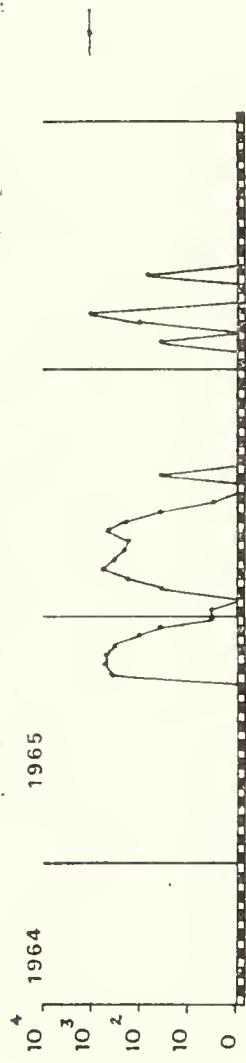


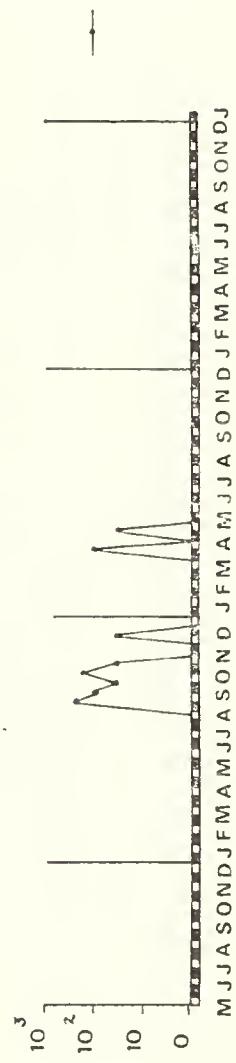
Fig. 11
Scenedesmus quadricauda (colonies).

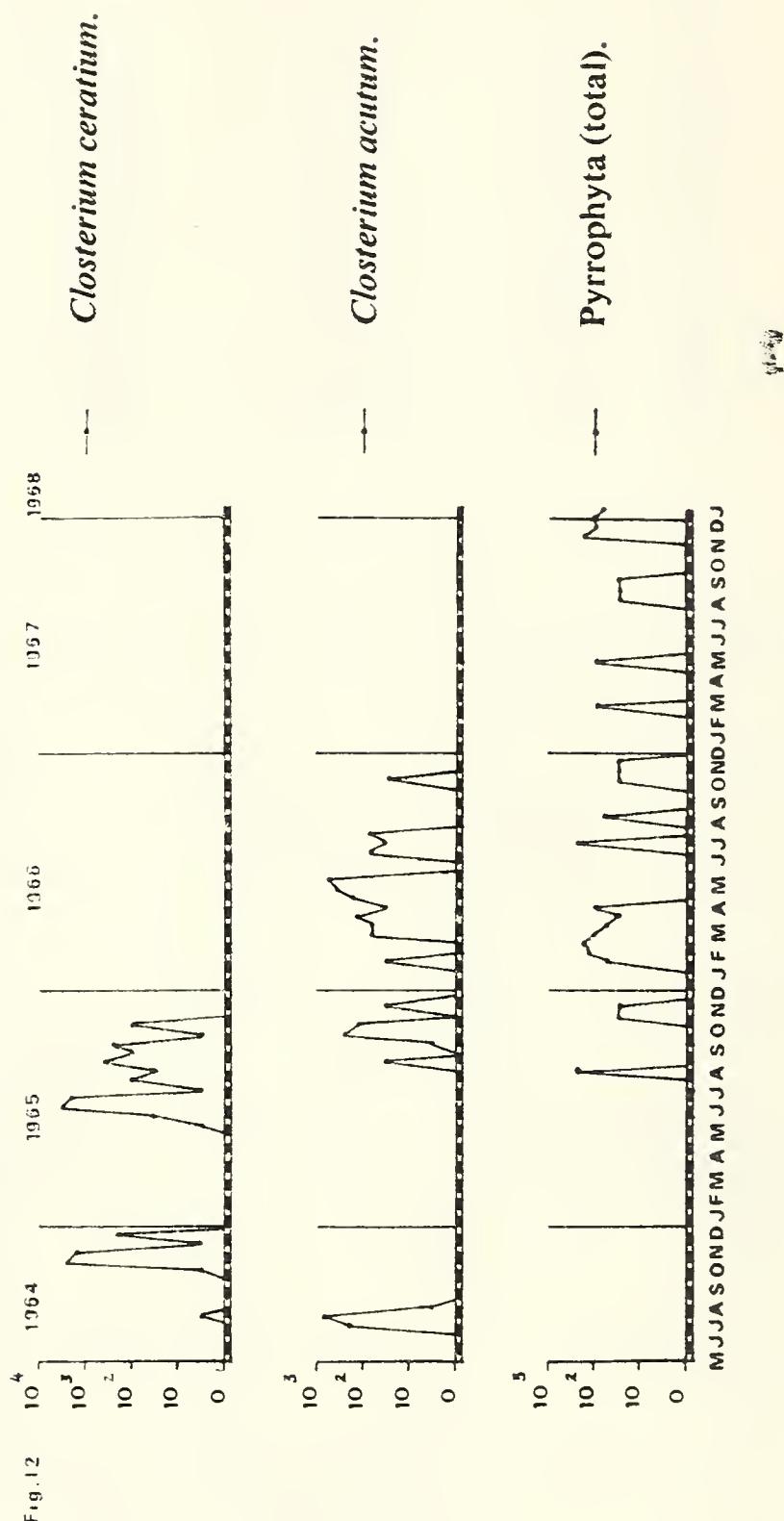


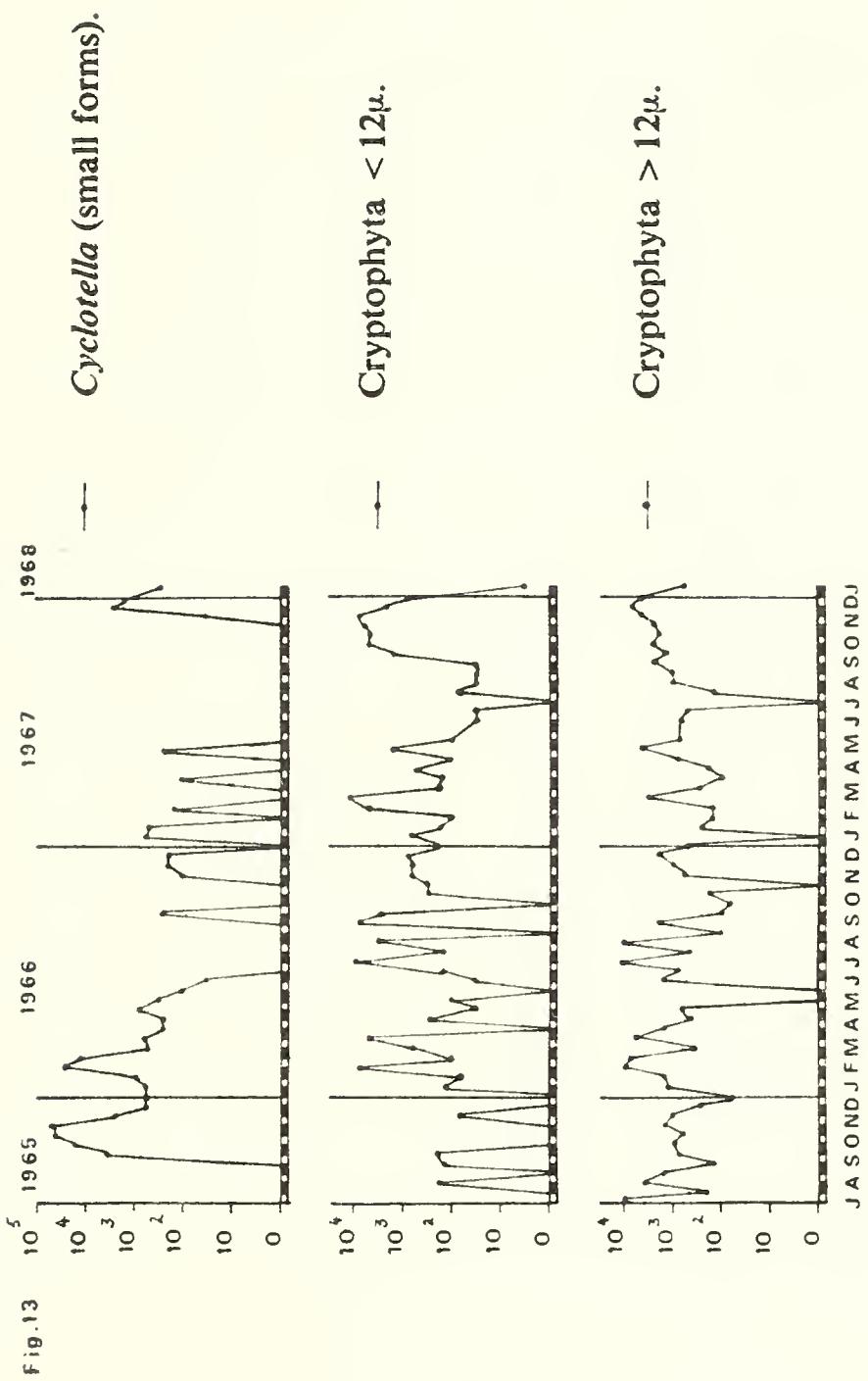
Tetraëdon staurogenaeforme (colonies).

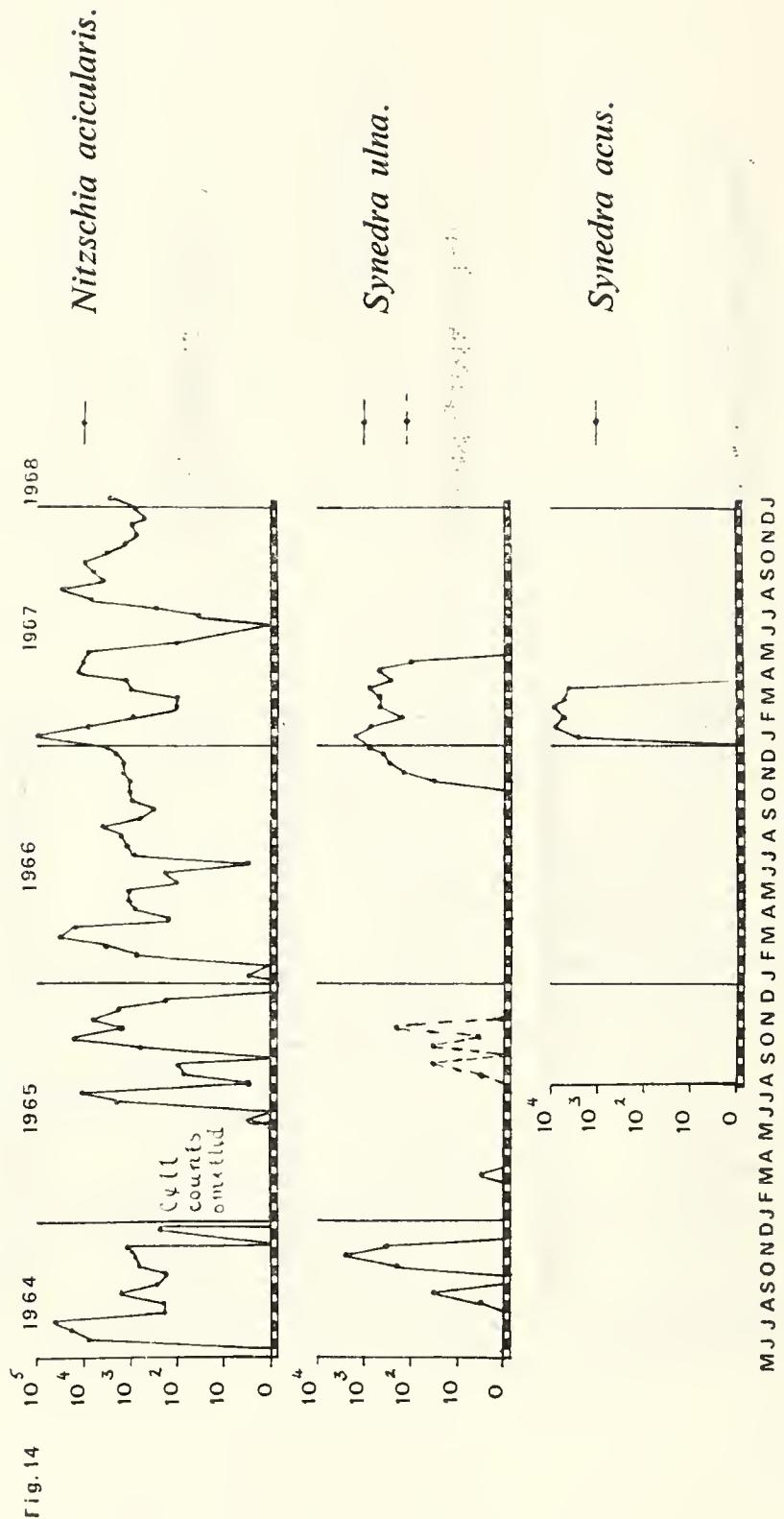


Treubaria triappendiculata.









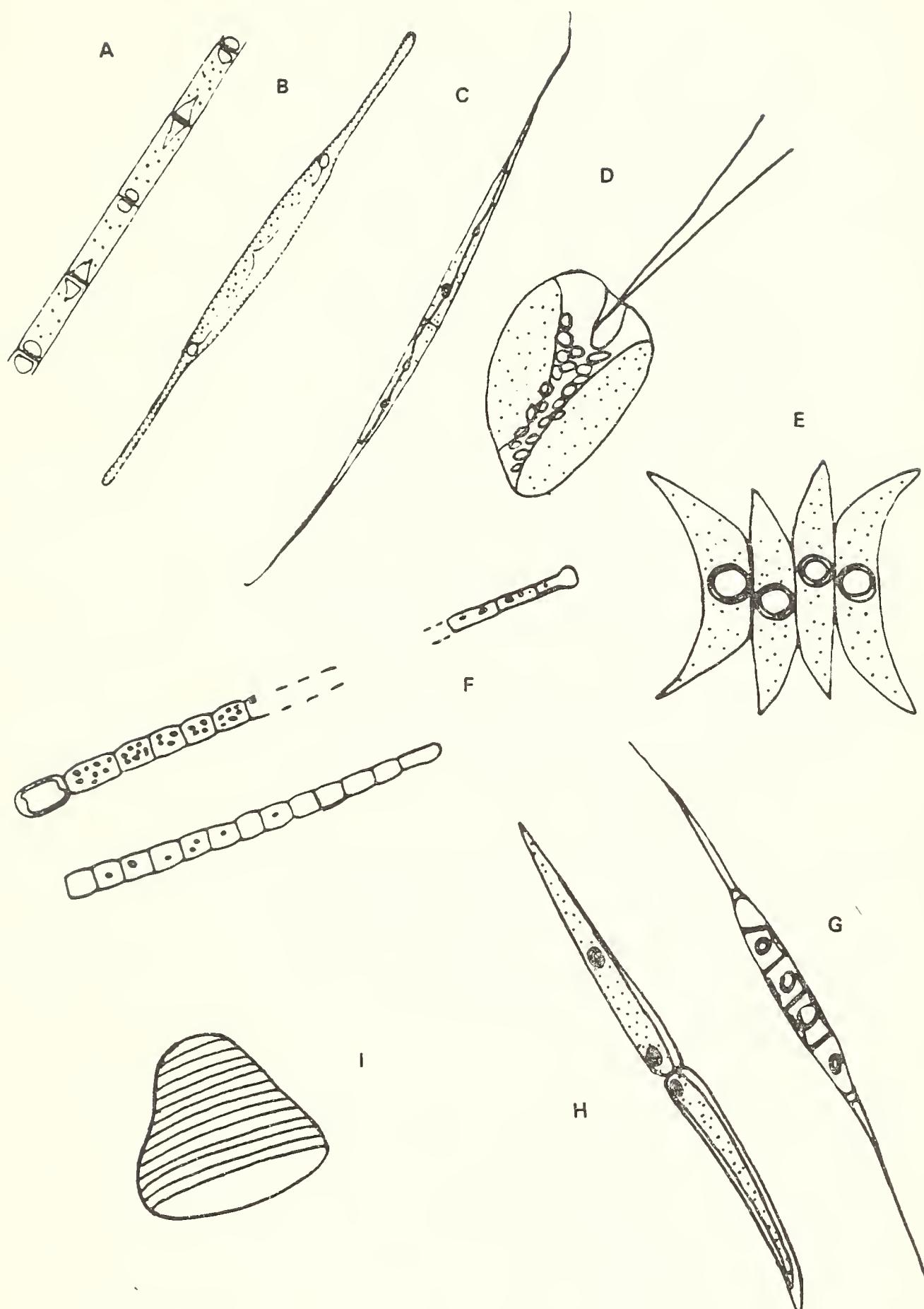


FIG. 15. (a) *Oscillatoria redekei*. (b) *Nitschia acicularis*. (c) *Raphidionema longiseta*. (d) *Cryptomonas erosa*. (e) *Scenedesmus acuminata*. (f) unknown blue-green alga. (g) *Schröderia robusta*. (h) *Raphidionema* sp. (i) lorica of *Bicoeca* sp.

such gas-vacuolate filaments of *Anabaena* are best included as forms of a very variable *A. flos-aquae* until they have been studied thoroughly with cultures obtained from isolated filaments.

The counting of straight filaments of *Anabaena* lacking heterocysts and spores caused some difficulty, as they were hardly distinguishable from those of *Oscillatoria agardhii*. By comparison of a range of samples, it was concluded that the *Anabaena* filaments were always very slightly more indented at the cross-walls than those of the *Oscillatoria*.

In one sample (7/67) there occurred filaments quite unlike any in the literature known to the author. Some examples of these are illustrated in Fig. 15. These filaments were slightly tapered, with the broader end c. 3.5μ wide and the narrower 2.0μ wide. The degree of tapering varied, but well-tapered filaments usually had the terminal cell of the narrower end developed into a head c. 3.5μ across. The broader end often ended in a heterocyst with two polar modules. These tapered filaments were apparently just beginning to develop gas-vacuoles.

Other filaments with only a slight tapering and lacking a terminal head appeared to provide a range of forms merging completely with the straight *Anabaena flos-aquae* filaments. This suggested the possibility that the tapered filaments represented either an alternative bottom-living phase of *A. flos-aquae* or the product of spore germination. Evidence pointing against this conclusion is the fact that untapered filaments were abundant in the plankton in the previous samples when no tapered ones were present.

Straight non-gas-vacuolate filaments of *Anabaena* c. 2.5μ wide were noted occasionally.

Aphanocapsa elachista W. et G. S. West var. *planctonica* G. M. Smith. Cells c. 2.5μ diameter. Present in August 1964 and 1965, reaching 1300 colonies/ml in sample 16/64; not seen subsequently. Fig. 1.

Chroococcus minutus (Kütz.) Näg. Cells 6 (-8.5μ) diameter. Noted only in sample 17/65.

Gomphosphaeria aponina Kütz. Present in the late summer of 1964 and 1965, reaching a total of 1800 colonies/ml in sample 16/65. Fig. 1.

Lyngbya sp. Filaments of *Lyngbya* with trichomes 4.5μ wide were occasionally noted during the winter. Culture experiments showed that *Oscillatoria agardhii* could turn into filaments similar to these, though no reverse experiments were done on the actual *Lyngbya* filaments found in samples.

Microcystis aeruginosa Kütz. Present in the late summer of 1964 and 1965. Fig. 1.

Oscillatoria agardhii Gom. Trichomes $4.4-4.5\mu$ wide. This organism was only with difficulty distinguishable from the *Anabaena* filaments described above. The seasonal distributions of these two organisms was interesting: as can be seen from Fig. 2, when one was present in high numbers, the other tended to be absent or present in only very low numbers.

O. limnetica Lemm. (See below).

O. redekei van Goor. Filaments of *Oscillatoria* $1.6-2.3\mu$ wide were the predominant alga in this lake. In the latter part of the survey period they were present throughout the whole year in high densities (Fig. 2). In fact it could well be claimed that they formed a permanent bloom. Their taxonomy however poses some difficulty, and will be treated fully in another publication. Briefly, the position is as follows. Both gas-

vacuolate and non-gas-vacuolate filaments were usually present, with the former in considerable excess. The former could be termed *O. redekei* and the latter *O. limnetica*. However, experiments showed that the gas-vacuolate form could develop in culture into a form indistinguishable from *O. limnetica*. Further, there were at times forms in the plankton ranging from typical *O. limnetica* to typical *O. redekei*. It would thus need culture experiments starting from individual filaments to sort out how many "species" were represented in the plankton of this lake. Total counts for these *Oscillatoria* forms are shown in Fig. 2.

Oscillatoria sp. *Oscillatoria* filaments 10-12 μ wide lacking gas-vacuoles, were occasionally noted in late winter. They formed a small pulse in March 1966. Filaments of *Myxophyta* about 0.8-1.0 μ wide, and also lacking gas-vacuoles, were frequent in late summer, ranging from an obvious bright blue-green colour to apparently quite colourless. A coloured type formed a burst from August to October 1967, with a maximum of 13,300 filaments/ml in sample 18/67. Similar narrow forms often became abundant in laboratory cultures using lake water inocula, even when none were noted by direct counting.

Spirulina subtilissima Kütz. Filaments 0.8-1.0 μ wide. Although this organism was represented in only low numbers, it was the only species in the lake which showed a very similar seasonal distribution in all four years. Fig. 2.

Spirulina sp. Trichomes of this form were 1.5 μ wide and very pale, or possibly quite colourless. They could perhaps be referred to *S. albida* Kolkwitz. Like *S. subtilissima*, occurrences were all in late summer. Fig. 1.

CHLOROPHYTA

1. Volvocales

Chlamydomonas? *incerta* Pascher. Formed a small pulse in samples 17, 18/65, but was not seen again; cells reaching 22 μ diameter.

Chlamydomonas spp. Small forms were sometimes frequent. Fig. 3.

Phacus lenticularis Ehr. Formed one major pulse in autumn 1965, and was occasionally present at all seasons in other years. Fig. 3.

Eudorina elegans Ehr. Counts of 35 colonies/ml in samples 21/65 and 10/66.

2. Tetrasporales

Elakatothrix viridis (Snow) Printz. Colonies noted on four occasions: 20/65 (35); 21/65 (35); 9/66 (140); 20/66 (+). Material variable, but all cells contain pyrenoids.

3. Chlorococcales

Actinastrum hantzchii Lagerh. Fig. 3. Attacked by *Aphelidium* (a protozoan parasite).

Ankistrodesmus acicularis (A. Br.) Korshik. Fig. 4.

A. angustus Bern. Occasional, with no obvious seasonal distribution.

A. arcuatus Korshik. Formed one pulse in autumn 1965 (Fig. 4). Distance between ends of cells c. 20 μ .

A. braunii (Näg.) Brunnthaler. Occurred once (Fig. 4). Dividing cells not seen, so cannot be separated from *A. pseudobraunii* Belcher & Swale.

A. falcatus (Corda) Ralfs. Fig. 5.

A. longissimus (Lemm.) Wille. Fig. 5.

A. ? pseudomirabilis Korshik. Fig. 4. Similar organisms have often been referred to *A. falcatus* (Corda) Ralfs var. *spirilliformis* G. S. West. A few cells of this shape survived laboratory treatment with actidione, which is unusual for a eucaryotic alga, so possibly a few blue-green algal cells were included in counts of this species.

A. subcapitatus Korshik. Fig. 5. The totals for all species of *Ankistrodesmus* are shown in Fig. 8.

Chlorella spp. Like many other forms of Chlorococcales, not noted after mid-1966 (Fig. 6). Attacked by *Aphelidium*.

Coelastrum microporum Näg. A major component of the plankton during the first part of the survey, but almost absent during the latter (Fig. 6). Occasionally attacked by *Aphelidium*.

Crucigenia apiculata Schmidle. Fig. 6.

C. rectangularis (A. Br.) Gay. Fig. 5, 6.

C. tetrapedia W. et G. S. West. Fig. 5.

Dicellula plantonica Swir. Noted only once, during a period of great species richness: 20/65 (+).

Dictyosphaerium sp. Fig. 6.

Didymogenes palatina Schmidle Fig. 7. Not counted before 20/65, and due to small size, possibly underestimated subsequently.

Franceia droescheri Schmidle. A few cells noted in summer 1965: 15/65 (35); 20/65 (+); 2/66 (35); 4/66 (+); 9/66 (105). Attacked by *Aphelidium*.

Lagerheimia ciliata (Lagerh.) Chod. Present in small numbers between June and November 1965. Attacked by *Aphelidium*.

L. quadriseta (Lemm.) G. M. Smith. Present in sample 20/65 (105).

Micractinium pusillum Fres. Occurrence irregular, but twice exceeded 1000 colonies/ml. (Fig. 7). Attacked by *Aphelidium*.

Oocystis crassa Wittr. Present as individual cells and colonies. Fig. 7.

Pediastrum boryanum (Turp.) Menegh. An important component of the plankton until autumn 1966, but absent subsequently. Fig. 10. Attacked by *Aphelidium*.

P. duplex Meyen. Fig. 10.

P. tetras (Ehr.) Ralfs. Fig. 10.

Scenedesmus acuminatus (Lagerh.) Chod. Almost always detectable in the plankton, but much more abundant in the earlier part of the survey. In Fig. 9 var. *biseriatus* Reinh. is included with counts of the type form, but var. *elongatus* G. M. Smith is shown separately in Fig. 10.

S. arcuatus Lemm. var. *platydiscus* Smith. Noted once: 14/66 (35 colonies/ml).

S. bicaudata Deduss. Noted three times: 20/65 (+); 21/65 (35 colonies/ml); 12/66 (35 colonies/ml).

S. bijugatus (Turp.) Kütz. Fig. 10.

S. quadriculauda (Turp.) Bréb. Fig. 11. Colony sizes showed a great range; the high count of 19,900 colonies/ml in sample 13/67 was associated with very small colonies.

Schröderia robusta Korshik. *Schröderia* cells were noted as follows: 14/66 (35); 17/66 (140); 18/66 (35); 21/67 (35). The material in the last sample resembled the description in Korshikov (1953) most closely, except that the cells formed only a very slight arc.

Siderocelis ornata Fott. Noted in only two samples: 20/65 (+); 21/65 (35).

Tetraëdron caudatum (Corda) Hansg. Not noted after early summer 1966. Fig. 9.

T. incus G. M. Smith. Noted in only two samples: 16/65 (+); 17/65 (+).

T. minimum (A. Br.) Hansg. Fig. 9. Frequently attacked by *Aphelidium*.

Tetrastrum staurogeniaeforme (Schröd.) Lemm. Fig. 11.

Treubaria triappendiculata Bern. Fig. 11. About one-quarter of the cells have four, rather than three, arms: cell size near the maximum of the range indicated in Korshikov (1953): diameter c. 12 μ , arms c. 18 μ .

4. Ulotrichales

Elakatothrix acuta Pascher. Noted only in sample 16/66 (35 colonies/ml).

Raphidonema longiseta Vischer. Occasional cells of this species were probably overlooked before September 1965; after this date, it became one of the most characteristic species, reaching a count of 32,400 cells/ml on April 26, 1966, Fig. 8.

Raphidonema sp. A form somewhat resembling Fig. 1F of Williams (1965) was seen on August 16, 1966, and is illustrated in Fig. 16 here. Dimensions of cells prior to division were 45-50 μ \times 3.5 μ .

Ulothrix limnetica Lemm. Formed one pulse in spring, 1966. Cells 4 μ wide.

Ulothrix sp. A few short *Ulothrix* filaments present in sample 15/65, presumably detached from epilithic growths.

5. Oedogoniales

Oedogonium sp. Short lengths of a filament 32 μ wide present in sample 21/65; presumably detached from epilithic growths.

6. Conjugales

Closterium acutum (Lyngb.) Bréb. Fig. 12. Cells referred to this species were all about 140-145 μ long, and possessed only one moving granule in the vacuole. There was however some variation in width and degree of curvature; the population present in summer 1966 had narrower straighter cells than noted previously.

C. ceratium Perty. Fig. 12. Like the previous example, the cells referred to this species showed considerable variety. The very narrow forms of *Closterium* present some taxonomic difficulty (Růžička, 1962), but those found in this survey do correspond quite well with the descriptions in West and West (1904).

Cosmarium abbreviatum Racib. Fig. 4. The cells were 13-15 μ long, 12-14 μ broad.

Cosmarium sp. Single cell of another species noted in sample 21/65.

Spirogyra sp. Short lengths of filament present in sample 5/65.

Staurastrum tetracerum Ralfs. Fig. 4. The cells referred to this species showed considerable variety, especially with respect to overall size and relative development of the processes. *S. tetracerum* is one of the three desmid species chosen by Nygaard (1949) as typical of Danish eutrophic lakes.

EUGLENOPHYTA

Euglena acus Ehr. Present in low numbers in sample 23/64 and during late summer 1965.

Euglena spp. Other *Euglena* spp. formed a small pulse in February and

March 1966 and 1967, and were very occasionally noted in other samples.

Phacus spp. Small forms of *Phacus* formed a small pulse during February and March 1966 and were very occasionally noted in other samples.

A large species formed a pulse in late summer during 1964 and 1965. *Trachelomonas* spp. occurred in numbers up to 500 cells/ml during late summer and autumn 1965, and were occasionally noted in other samples. Apart from the one pulse, there was no obvious association with any particular time of year.

Besides these coloured forms there occurred occasionally also colourless ones e.g. *Petalomonas* spp.

XANTHOPHYTA

Botryococcus braunii Kütz. Noted in samples 17/64, 22/64, 22/65.

Goniochloris mutica (A. Br.) Fott. Noted as follows: 19/64 (+); 17/65 (+); 18/65 (140); 19/65 (35); 20/65 (340); 21/65 (175); 22/65 (70); 12/66 (35).

Goniochloris smithii (Bourrelly) Fott. Formed one small pulse: 16/65 (+); 17/65 (35); 19/65 (35); 20/65 (+); 21/65 (140).

Tribonema sp. Noted occasionally up to early summer 1966, with no obvious seasonal differences.

CHRYSTOPHYTA

Mallomonas sp. Noted in sample 13/64 only.

Small chrysophyte flagellates were noted occasionally in late winter and early spring samples, especially in 1966 and 1967. Lorias, mostly empty, of a species of *Bicoeca* (colourless flagellate) occurred in sample 8/67 at a density of 105 cells/ml. These lorias do not appear to correspond exactly with any published picture, though they have some similarity with *Bicoeca mitra* Fott var. *suecica* Skuja. The lorias are triangular-campanulate in side-view, 11–12 μ long and 12–13 μ broad at the mouth (Fig. 15).

An amoeboid chrysophyte was noted in sample 18/65.

PYRROPHYTA

As shown in Fig. 12, dinoflagellates were not a major component of the plankton. The forms that did occur were mostly species of *Peridinium*, though the pulse in winter 1967/68 was caused by a small quite colourless and naked form.

CRYPTOPHYTA

Cryptophyta were not included in counts before June 1965. In the period counted they almost always formed the great majority of the photosynthetic flagellates.

The forms noted are listed in Fig. 13 simply as two groups: those 5–12 μ in length, and those greater than 12 μ . The smaller forms occurred in a considerable variety of both shapes and colours (brown, green, green-blue, colourless). With one exception, the larger forms were some shade of brown, and the great majority could be regarded as forms of a very variable *Cryptomonas erosa* Ehr. A species of *Chroomonas* 30 μ long occurred at a density of 70 cells/ml in sample 15/66. The exception to the generalization on colour is *Cyanophora paradoxa* Korshik., which occurred at a density of 105 cells/ml in sample 7/67. These cells were indistin-

guishable from those of the well-known research organism held in the Cambridge culture collection.

BACILLARIOPHYTA

A list of species found in 1964 and 1965 is given in Whitton (1966). However, rather few species made up the great majority of diatom counts. In fact, a single species, *Nitzschia acicularis*, accounted for over half the total diatom cell counts. The following is a brief account of the more important diatom species.

Amphora ovalis Kütz. This was present in moderate numbers between November 1964 and August 1965, and occasionally also at other times. Occurred in two forms, the typical one and one with two bare areas in the striations.

Cyclotella glomerata Bachmann. This was by far the most abundant of the *Cyclotella* species. The total for small *Cyclotella* species from August 1965 is given in Fig. 13. They were abundant also in winter 1964/65.

Nitzschia acicularis W. Smith. Fig. 14. Frequently with 1 or 2 chytrids attached.

Synedra acus Kütz. Fig. 14. Frequent also during winter of 1964/65, though no counts made.

S. ulna (Nitzsch) Ehr. Fig. 14.

In addition to the species listed in Whitton (1966) the following further species were identified by Mr. A. J. Peabody from preparations of diatoms from this lake:

Ceratoneis arcus Kütz.

Nitzschia palea (Kütz.) W. Smith

Cocconeis scutellum Ehr.

N. sigmoidea (Ehr.) W. Smith

Cymbella prostrata (Berkeley) Clove

Stephanodiscus? *astraea* (Ehr.)

Gomphonema olivaceum (Lyngb.)

Grun. near var. *minutula*

Kütz.

(Kütz.) Grun. (18 μ diameter)

Thalassiosira fluviatilis Hust.

DISCUSSION

The great bulk of the phytoplankton of this lake consisted of species from four phyla. These are, in decreasing order of importance: Myxophyta, Chlorophyta, Bacillariophyta, Cryptophyta. In three of the phyla, one species was both more consistently present, and also usually much more abundant, than any others. These species were *Oscillatoria redekei*, *Nitzschia acicularis* and *Cryptomonas erosa*. These all showed considerable variation in their morphology. The situation in the Chlorophyta is less easily summarized. There were marked changes in the flora of the lake during the period under study, and such changes were especially noticeable in the green algae. The most abundant species of green alga during the early period were usually *Scenedesmus acuminatus* and *S. quadricauda*, whereas during the latter it was usually *Raphidionema longiseta*.

The general changes in the flora which took place during the period can be summarized as follows. In 1964 blue-green algae were almost absent until the beginning of August, when they then rapidly reached bloom proportions. In 1965 the blue-greens did not develop until very late, in early October. However they developed again in March 1966, and from then until the end of the survey blue-green algae were always present in bloom or near bloom proportions. Green algae, mostly

Chlorococcales, were abundant during spring and summer periods when the blue-green algae were absent; that is up to the end of July in 1964 and the end of September in 1965. When the blue-green algae were abundant the green algae were poorly represented in numbers and very poorly represented in species. In 1964 and 1965 the green algae became gradually richer in species as the season developed, until the sudden drop associated with the development of the blue-green algae. An exceptionally rich green algal flora developed in August and September, 1965, and some species were seen only during this period e.g. *Dicellula planctonica*. One example of the contrast between the situation without and with a blue-green algal bloom is that there were 23 species of green algae in the counts on August 17, 1965, but only 3 on August 16, 1967. As can be seen from the figures, many species of Chlorococcales were abundant during the early part of the survey and largely or entirely absent during the latter part e.g. *Coelastrum microporum*, *Crucigenia* spp., *Pediastrum boryanum*. On the other hand very narrow, pointed species of *Ankistrodesmus* became frequent only in the later stages of the survey. In morphological terms it can be stated that colonial forms were the predominant type of green alga at the beginning of the survey, whereas very narrow, long-pointed forms were predominant at the end.

A rather similar change in the blue-green algal flora was also apparent during the survey. Members of the Chlorococcales (almost all colonial forms) were represented during the summers of 1964 and 1965, but were quite absent during 1966 and 1967.

Among the diatoms, *Nitzschia acicularis* formed bursts at various seasons of the year. But the other species which achieved counts of over 1000 cells/ml for a month or more did this during the months from December to March. The characteristic winter species of diatom varied however from year to year. These were: 1964/65, *Amphora ovalis*, *Cyclotella glomerata*, *Nitzschia acicularis*; 1965/66, first *Cyclotella glomerata*, later *Nitzschia acicularis*; 1966/67, *Nitzschia acicularis*, *Synedra* spp.

It is unfortunate that almost nothing is known about the likely causes of the changes in the flora which took place during this period. The installation of sprays in September 1966 had no obvious effect on the flora. The flora was rich in species at the beginning of the survey, even though the lake had been cleaned only four months previously. Presumably this cleaning had not been very thorough, and many species had survived in the mud. It is to be hoped that if ever the lake is emptied and cleaned again, a very long term chemical and biological study of the changes will be made.

SUMMARY

Phytoplankton counts were made on water samples taken at two-week intervals from the lake in St. James's Park, London. The great bulk of the phytoplankton consisted of species from the phyla Myxophyta, Chlorophyta, Bacillariophyta, Cryptophyta. During the four years of study there were considerable changes, but from 1966 onwards at least one species predominated in each of these four phyla. These were *Oscillatoria redekei*, *Raphidoneema longiseta*, *Nitzschia acicularis*, *Cryptomonas erosa*.

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The author is very grateful to the Ministry of Agriculture, Fisheries and Food for help in obtaining samples, most of which were collected by either Mr. B. A. Martin or Mr. M. Lain. He is also most grateful for chemical analysis made by Mr. M. Snow; for help in preparation of diatom slides by Mr. G. Bainbridge and of figures by Miss K. MacArthur; for advice on the identification of Chlorococcales from from Drs. E. M. F. Swale and J. H. Belcher, who also kindly read through the manuscript; and for references useful in identification given by Dr. J. W. G. Lund.

APPENDIX

If any teacher does decide to use material from this lake for teaching, the author would be very pleased to help with identification problems. Needless to say, he would be delighted to hear from any other people wanting to carry on with this or any other studies on this lake.

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Mammals in the London Area, 1967

By IAN R. BEAMES

THIS report adopts a somewhat different style from that used last year. For the commoner species no attempt has been made to reproduce lists of localities and thereby repetition of the same lists, two years running, has been avoided. This makes no difference to the vital need for continuous yearly reporting of the common species by all observers.

Knowledge can only be increased by people searching for new ground and the purpose of this paper is to attempt to add further stimulus to the continued improvement shown over the past few years, in the recording of London's mammals.

General successes during the past year are threefold. Firstly there has been an increase in the number of people paying more detailed attention to mammals. Secondly, as a result of considerable press publicity of the report published last year, over 200 letters from non-members were received by the Recorder, giving scores of most useful observations. Indeed it is interesting to note here that the life of one family of foxes was chronicled by no less than four people in the same road, all quite independently. Lastly there is now an active, mutual co-operation between the Recorder and his counterparts in six other societies working in the London Area.

Co-operation and co-ordination, of which there is all too little, are two vital items in the study of Britain's wildlife. It is to be hoped that any society working in the London Area, which acquires information on London's mammals, will join those already active on the subject. The Recorder will be pleased to hear from them.

This present paper follows the standard procedure adopted in past issues of the *London Naturalist*; the letters B, E, H, K, M and S stand for the counties of Buckinghamshire, Essex, Hertfordshire, Kent, the old county of Middlesex and Surrey. Other abbreviations used are G.C.—Golf Course, G.P.—Gravel Pit, L.N.R.—Local Nature Reserve, M.O.—Many Observers, R—River, Res.—Reservoir and S.F.—Sewage Farm. The check list numbers and specific names are from Corbet (1964).

I should like to thank all those people who sent in records, and in particular to those people who worked hard to produce detailed lists of their local mammals. My thanks go to John Burton who is responsible for the preparation of all the distribution maps, those seen here and those as yet awaiting space for publication. I must also acknowledge the help received from the Croydon N.H.S., the Essex Mammal Group, the Hillingdon N.H.S., the Lewisham N.H.S., the Ruislip N.H.S., the Surrey Naturalist Trust and various members of the Metropolitan Police who have been submitting details of animals seen during the course of their duties. I would also like to thank Linda Smeeton for typing the manuscript for me.

The following is a list of contributors, only omitting the large number of non-members who sent in records after the press publicity, whose names are too legion to mention. My apologies go to anyone inadvertently omitted.

LIST OF OBSERVERS

E. F. Anderson, Mrs. E. Anderson, I. R. Beames, Mrs. L. A. Beames, Dr. G. Beven, A. F. Blakeley, P. F. Bonham, Miss E. P. Brown, J. A. Burton, N. Burton, E. M. Clark, J. R. Colclough, J. Cooper, Croydon N.H.S., Miss R. Davis, E. L. Dawson, P. J. Edwards, T. G. Ferguson, E. M. Forsyth, H. J. Freeman, Mrs. P. A. Freshwater, D. J. Garbutt, Mrs. E. M. Gay, Miss M. Goom, M. W. Green, G. H. Gush, E. H. Herbert, Hillingdon N.H.S., Miss E. M. Hillman, J. H. D. Hooper, K. H. Hyatt, Mrs. E. Hyatt, I. G. Johnson, Miss M. E. Kennedy, P. K. Kinnear, J. W. Landells, Mrs. Y. Laver, Lewisham N.H.S., Miss A. Lightfoot, P. Livesley, D. Macer-Wright, W. R. Merrington, E. Milne-Redhead, Mrs. H. Morris, P. A. Morris, P. A. Moxey (P.A.My), A. F. Mussellwhite, Mrs. B. S. Mussellwhite, Mrs. E. Newman, D. Parr, A. B. Pepper, Miss E. Pritchard, F. C. Reeves, R. E. Sanderson, S. D. G. Shippard, T. R. Smeeton, Mrs. L. M. Smeeton, Mrs. K. Smith, Miss K. E. Springett, P. J. Strangeman, S. Tapper, W. G. Teagle, Mrs. J. F. Teagle, P. C. Tinning, Mrs. P. A. Tinning, E. Venis, Mrs. A. Warren, M. Warren, R. B. Warren, J. P. Widgery, P. J. Wilson, Dr. D. W. Yalden and the following members of the Essex Mammal Group: R. Allen, K. Ashman, D. Corke, R. Cowlin, B. Eastcott, N. L. Harris, M. Parker, C. Pitman, C. B. Pratt and P. Stothert.

Finally, it should be mentioned that the Society is no longer in a position to rely on Pat Morris and Derek Yalden to provide the bulk of its mammal records. Both have careers which take them away from the London Area for much of the year. There is thus an urgent need for one or two new, dynamic young zoologists as replacements.

SPECIES NOTES—1967

INSECTIVORA

1. HEDGEHOG. *Erinaceus europaeus* L.

The hedgehog is the most familiar animal to millions of people and is more frequently recorded than most of London's mammals. Since the publication of "The Hedgehog in London" in this journal (Morris, 1966), only a small amount of fresh information has been obtained but the volume of records is fortunately undiminished. There were well over 400 individual records in 1967, with an increase in the number of people who had clearly taken pains to observe their "own" animals throughout the year.

There were again several records of hedgehogs active in winter: fifteen for November and four each for December, January and February.

The slaughter on London's roads continues, with 177 reported as "dead on the road" (excluding the following note from Essex). These are mainly casually noticed animals but there are two instances of regular examination of a particular sector of road which indicate the enormous number which must die in this way each year. The first is from Essex where "approximately 100 seen killed during 1967 on the A.122 and the A.128 between Epping and Brentwood, a distance of about 20 miles" (per FCR). The second is from Surrey where eleven individuals met their death on a single stretch of much-frequented B-class road a mile long, in Ewell, during a period of twelve weeks (IRB).

The distribution of the hedgehog has been well described in Morris,

1966, and it is sufficient to say here that the present inner limit of suburban hedgehogs seem to be the approximate inner limit of suitable gardens, namely New Cross, Peckham, Brixton, Clapham and Battersea in the south and Newham, Hampstead and Acton in the north. Animals are also recorded regularly from Inner London in the Royal Parks and must represent a wild population, probably isolated there. Thanks mainly to the efforts of the Essex Mammal Group of the Essex Field Club, there is an increasing number of records from that county. Many more would be helpful.

From several non-members came reports of hedgehogs dying in their gardens. These were from several parts of the area and the symptoms described were often typical of poisoning by insecticides. One lady who had recently sprayed her roses with a potent fungicide had her family of three animals die in front of her eyes the following day.

Other individual reports of particular interest are:—

K One dead near a fox earth at New Eltham on Apr. 4 had been skinned, presumably by the inhabitants of the earth (EFA).
M One dead on the Heathrow Airport perimeter road on May 8 (Hillingdon N.H.S.).

An adult with 7 young were fed each evening during the summer, in a garden in Cricklewood. This is a large litter.

S Two flattened corpses were found by a badger sett on Wimbledon Common (JWL).
One reported in the *Surrey Comet* as being responsible for an accident in Kingston-upon-Thames on July 15. The animal was crossing a road and caused a collision between a motor cycle and a car. There were only slight injuries to the people. The hedgehog escaped unhurt. (per PAM).

2. MOLE. *Talpa europaea* L.

Although the mole is rarely seen it is a very easy animal to record, purely by observations of fresh mole-hills. The distribution of the mole and the problems facing it in the London Area were described in this journal in 1967 (Burton, 1966b). Since that time little further fresh information has been reported. All of the records for 1967 are from the rural or outer suburban area, none being within 14 miles of the centre of London. There is an urgent need for all positive and definite negative records nearer than this distance in order that some estimation of the inner limit of the range of the animal may be made.

This is an animal which is easily recorded while performing such activities as bird-watching and botanical grid recording. All records should be sent in; there were only 39 such records in 1967, and several of these came from the Essex Mammal Group.

3. COMMON SHREW. *Sorex araneus* L.

The distribution and methods of location of this animal were recently described in this journal (Burton, 1966b). Like all small mammals the several ways of locating it vary in efficiency. In 1967 there were 29 dated records. Of these 10 were of animals found dead in bottles (33 individual animals), 9 were records of animals found dead (9 individual animals), 4 were animals trapped alive (7 individuals), 3 were of animal remains in bird pellets (9 individuals) and 3 were of animals found alive,

usually under discarded metal sheets (5 individuals).

Analysis of the 9 animals found dead shows that 8 occurred in the Autumn between July 18 and October 21 and the remaining one was on January 3.

Most of the records still come from the outer areas and only one, at Beckenham Place Park (PKK) could be described as fairly near to the centre of town. This is a species which, because of the difficulty experienced in locating it may well be present in many places nearer the centre of London than the records show.

The few records for counties other than Surrey are given below:

E Galley Hill Wood (DC of E.M.G.).
 K Beckenham Place Park (PKK). Knockholt (IRB). Shoreham (PCT, PAT, PKK).
 M Barn Hill and Bentley Priory (HM). Bushy Park (PAM). Kempton Park (DP). Teddington (MG).

4. PYGMY SHREW. *Sorex minutus* L.

From trapping results elsewhere it has been estimated that Pygmy Shrews represent between 10% and 15% of the total shrew catch. (Southern, 1964). This year's records, and those for 1966 published last year represent almost exactly this figure when compared with the Common Shrew records. Little is known of this animal in the London Area.

M Ruislip: Singles found dead on June 20 and 26 (AFB). Teddington: One dead in a bottle Dec. 22 (PAM).
 S Claygate: One seen Mar. 25 (PAM). Headley: One dead in a bottle Mar. 5 (IRB, LAB). Richmond Park: Several in Barn Owl pellets (EMF).

5. WATER SHREW. *Neomys fodiens* (Schreber).

B Colnbrook: One caught in September (PAM).
 M Bayhurst Wood: One watched swimming and on a log at 5.00 a.m. on June 10 (AFB).
 S Thorpe G.P.: One, a lactating female, caught in the bottom panel of a mist-net at the edge of a reed bed (GHG).

CHIROPTERA

The records are published in full.

11. WHISKERED BAT. *Myotis mystacinus* (Kuhl).
 S Godstone: Seven hibernating on Jan. 7 and 2 on Nov. 19 (IRB, PAM, DWY).
 12. NATTERER'S BAT. *Myotis nattereri* (Kuhl).
 S Godstone: Two hibernating on Jan. 7 (IRB, PAM).
 14. DAUBENTON'S BAT. *Myotis daubentonii* (Kuhl).
 S Godstone: Four hibernating on Jan. 7 and 1 on Nov. 19 (IRB, PAM, DWY).
 16. SEROTINE BAT. *Eptesicus serotinus* (Schreber)
 S Esher: 17 roosting in a house roof on July 22 (IRB, PAM).
 18. NOCTULE. *Nyctalus noctula* (Schreber)
 M Kensington Gardens: c.20 in a tree which was felled (JPW, RES).
 S Esher: One identified by electronic "bat detector" July 21 (PAM, JHDH).

19. PIPISTRELLE. *Pipistrellus pipistrellus* (Schreber).

S Esher: Several identified by electronic "bat detector" on July 21 (PAM, JHDH).

21/22. LONG-EARED BAT. *Plecotus* sp.

S Godstone: One hibernating on Nov. 19 (IRB, DWY). Weybridge: One found drowned in an outside toilet cistern on Dec. 16 (GHG).

CARNIVORA

24. FOX. *Vulpes vulpes* (L.)

The fox appears to have spread into the inner parts of the city and is now regularly recorded from New Cross and Dulwich in the east to Wandsworth and Putney in the west. It would appear to have occupied most of the suitable areas containing open spaces and large gardens in the southern half of the area. Information from the northern sector is rather more scanty but the advance into the built-up area appears to be on a similar scale to that which is occurring in the south. Preliminary investigation has commenced into the variety of food taken by London's foxes. All observations of positively identified prey or other food should be sent to the recorder. It is intended to publish a short interim report on this subject next year.

Cubs were seen at the following localities near to the centre of London:

K Beckenham, Bromley, Eltham, Forest Hill.

M Hampstead.

S Dulwich, Sydenham, Thornton Heath, Wimbledon Common.

Cubs were seen at 34 localities all told. The following are among the most interesting records:

K New Eltham: Food taken nightly by a family of foxes which would come to the observer's call (EFA). Bromley: A vixen has brought cubs to a large garden for several years. They come regularly for food and some have become tame. One animal has allowed itself to be stroked (CEA).

M Pinner G.C.: Sixteen shot during a Ministry of Agriculture pest shoot on Jan. 11 (per IGJ).

S Selsdon Woods: Twenty-five shot during the year by the keepers (per Croydon N.H.S.).

Weybridge: June 10, 4 chickens killed. June 11 a lactating vixen found entangled in the wire of a chicken run. She was very badly torn and had two legs broken and was therefore destroyed (GHG).

Carshalton: A vixen dug out her gassed cubs in an earth in the railway bank and carried them away for a short distance.

Bookham Common: The keeper Mr. E. Youngman purchased 2 geese on Nov. 9 and lost both to a fox the same night (per FCR).

Royal Wimbledon G.C.: Several foxes here are apparently causing problems because they play in the bunkers and churn up the sand (JWL). There have been reports from other golf courses of foxes running away with golf balls, presumably pursued by irate golfers.

Sanderstead: A family of foxes regularly in gardens here. They have been watched playing on the lawn at the same time as the observer's baby daughter (EMG).

27. STOAT. *Mustela erminea* L.

E South Weald: One on Apr. 9 (PS of E.M.G.).

M King George VI Res.: One running along the bank on Nov. 12 (DJG).
 S St. Anne's Hill G.P., Thorpe: One being mobbed by linnets on July 15 (GHG).

In Essex JRC has been noting mammals for some years and is satisfied that stoats are more numerous than weasels in the Epping Forest area. This has also been the experience of 1 or 2 zoologists working farther out in rural Essex. More records from observers in this area would be welcome.

28. WEASEL. *Mustela nivalis* L.

B Colnbrook: One caught in Sept. (PAM).
 E All records are from the Essex Mammal Group.
 Bury Wood: July 12, Connaught Waters: Sept. 23, Gt. Warley: May 13, South Weald: June 22, Stifford Clays: July 4, Warren Hill: Sept. 3.
 H Old Parkbury: One on Jan. 1 (ASK).
 Ridge and Shenley: Seen on several occasions (ASK).
 K Otford: One watched hunting on Apr. 16 (PCT).
 M Grand Union Canal: One on May 2 near Blackjack Mill, swam along the canal and climbed onto the roots of a tree stump where it sat drying its fur (AFB).
 Staines: One ran across the causeway of the reservoirs on Aug. 12 (PFB). Four records from the Hillingdon N.H.S. from this area. Singles on Sept. 8 and Nov. 8 at Staines Res. and at King George VI Res. on Sept. 2 and Nov. 26.
 S Bookham Common: One on June 11 and 2 on July 9 (EMF, EMH, AL).
 Buckland: Four dead on a gibbet Dec. 13 (IRB).
 Princes Coverts: One seen hunting on Mar. 4 and 1 on July 24 seen to pursue and catch a vole which ran onto a path (IRB).
 Selsdon Woods: Five shot by keepers during the year. (Croydon N.H.S.).
 Thorpe: One on Mar. 24 watched dragging a dead young rat into cover by a path (GHG).
 Wimbledon: One on the common on July 9 (JWL) and 1 in the grounds of Kings College School on Apr. 2 (MWG).

31. BADGER. *Meles meles* (L.)

A paper on this species appears elsewhere in this journal.

32. OTTER. *Lutra lutra*. (L.)

While there are no records for 1967 there were 3 for 1966, all in the South and West of the area. The localities are not being published. Observers who frequent lakes and rivers are asked to report any possible signs of otters to the Recorder at once.

ARTIODACTYLA

44. FALLOW DEER. *Dama dama* (L.)

K Lullingstone Park: One, seen well, of the dark form, on Aug. 5 (PCT *et al.*).

45. ROE DEER. *Capreolus capreolus* (L.)

All the records are from Surrey. The species appears to be spreading slowly into suitable woodland in this county. It has clearly negotiated the R. Mole successfully and may well appear in places such as Esher, Oxshott, Epsom and Ashtead.

Bookham Common: A family group of three seen on several occasions from June to December (GB, DMW). Slots and droppings found N. of

the common on December 22 (IRB). Reports from local residents and a gamekeeper at Stoke D'Abernon indicate that several are present and have been seen up to the banks of the R. Mole in this area.

Fetcham Downs, Leatherhead: An adult with a newly born fawn on May 26 (EHH).

White Hill, Mickleham: Fresh slots found on February 4 (IRB, LAB). From information received from the Surrey Naturalists Trust it is apparent that Roe have been established in Headley for several years, probably since 1961.

46/47. MUNTJAC. *Muntiacus* sp.

Away from the woods of Herts. around Potters Bar the only record received for 1967 is of one, which, first seen late in the year, spent some six months in the Hayes, Middx. area, taking up residence in the Manor House L.N.R. It was filmed and on one occasion, caught (Hillingdon N.H.S.).

LAGOMORPHA

53. HARE. *Lepus capensis* L. (*Lepus europaeus* Pallas)

A distribution map and comments on this species have appeared recently in this journal (Burton, 1967). There is little further information and the records still reflect, as in most other species, the activities of observers. It is interesting to note that half of the ten records received come from people who are not members of the society.

E Epping Forest (1 locality only!) Theydon and South Weald, (E.M.G. AW).

M Enfield (AW).

S Bookham Common (EMH). Cobham (PAM). Hersham (GHG). Stoke D'Abernon (IRB).

55. RABBIT. *Oryctolagus cuniculus* (L.)

It is intended to publish an interim survey on the rabbit in the London Area shortly. All records are required urgently.

RODENTIA

57. GREY SQUIRREL. *Sciurus carolinensis* Gmelin.

The following are interesting notes from the year's records.

H Stockers Lake, 1 seen swimming strongly across the Grand Union Canal (AFB).

M Perivale Wood, 46 seen on Feb. 12, of which 31 were shot (5 males, 26 females) (ELD).

S Nesting in roofs in Esher (GB) and Weybridge (GHG).

Ewell Court Park, 76 were shot by the keepers, reducing the population to 3 or 4 individuals, much to the fury of the local children who used to come in dozens to feed the tame Squirrels (IRB).

Ewell, 1 climbing a telegraph pole in mistake for a tree on Oct. 20 (IRB).

Selsdon Woods, 49 shot during the year (Croydon N.H.S.).

61. HARVEST MOUSE. *Micromys minutus*. (Pallas).

B Colnbrook, 1 caught Sept. 19 (PAM).

S Bookham Common, a nest found on Feb. 12 (GB).

Thorpe, 1 on Mar. 28 watched closely, climbing some 4 feet off the ground in a sallow bush. It appeared to be burying its nose in the sallow flowers (GHG).

64. HOUSE MOUSE. *Mus musculus*. L.

Inner London: Victoria Tower Gardens, Westminster on October 10 and several dates thereafter, 5 competing with Sparrows at 12.30 p.m. for bread thrown by an old lady (GHG).

67. BANK VOLE. *Clethrionomys glareolus* (Schreber).

New localities are:

B Colnbrook, 2 trapped in Longworths, Sept. (PAM).
 E Beachet Wood, Deer Park Wood, Galley Hill Wood and Pilgrims Hatch, 1 trapped in Longworths at each of the above places (DC, E.M.G.).
 S Addington, 2 trapped in Longworths in Dec. (TRS).
 Only 16 records were received.

68. WATER VOLE. *Arvicola terrestris* (L.)

B Black Park, 1 at the lake (AFB).
 E Epping, 1 on Feb. 4 (AFM, BSM). Gt. Myles Lake, 3 on Aug. 27 (NLH).
 H Horton Kirby, 1 on Sept. 10 swimming in the R. Darent, undisturbed by many anglers (PCT, PAT).
 M Bayhurst Wood, 1 in the lake (AFB) Ruislip L.N.R., "Has cleared such a large area of reed grass that it is now possible to move a boat into open water which was choked a year ago" (PAMY).
 Staines Moor, large numbers in the R. Colne and the canal (EM-R).
 S Bookham Common, frequent records (GB, FCR).
 Stoke D'Abernon, tracks in the mud by the R. Mole (IRB).

69. FIELD VOLE. *Microtus agrestis* (L.).

New localities are:

B Colnbrook (PAM).
 E Loughton (AFM, BSM). Pilgrim Hatch (DC).
 M Teddington, Kempton Park (DP).
 S Addington (TRS), Epsom Common (IRB), Tandridge (IRB), Whyteleafe (PKK).
 Very few records were received.

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The Badger in the London Area

By W. G. TEAGLE

INTRODUCTION

THE BADGER *Meles meles* (L.) is not one of the most familiar mammals of London's countryside, and relatively few people living in even the more rural parts of the London Natural History Society's Area can have ever seen one in the wild. Yet, as was remarked by Fitter (1949), the Badger is commoner around London than is generally supposed.

Towards the end of 1959 a group of members of the Society's Ecological Section with a special interest in mammals, suggested that an enquiry might be conducted to investigate the Badger's status and distribution in the London Area, and a systematic search made for Badger sets*. Enough information had already been collected during 1959 for it to be seen that this was well worth the effort, and it was thought that the project might interest members of the Society's newly-formed Young Naturalists' Section. I was asked to conduct the Society's Badger Survey, and the Young Naturalists' first field visit to a Badger set was made on October 18, 1959. The Survey was continued until the end of 1964, although by April 1963 I had left the London Area and was no longer able to take part in the field work.

In 1960 the Mammal Society (then called the Mammal Society of the British Isles) started its National Badger Survey under the guidance of Dr. Ernest Neal and T. J. Pickvance, and I was invited to be the Mammal Society's Badger Recorder for the London Area.

This paper, long overdue, summarises much of the information obtained over the years 1959 to 1964. It is only intended to present a rather general picture, and I hope that it will be followed by other more detailed papers based on further work.

RECORDING BADGERS

Since one of the objects of the present paper is to persuade members of the Society to make further observations on the Badger in the London Area, and submit them to the Recorder of Mammals (Ian Beames, 69 Gadesden Road, Ewell, Surrey), I need make no apology for describing ways in which the presence of these animals may be detected.

As the Badger is nocturnal, a Recorder cannot expect to receive many sight records, except from the ever-growing company of enthusiastic set-watchers and photographers. Fortunately Badgers leave plenty of clear evidence of their existence, even if they themselves remain unseen. I must confess that I had had very little field experience of Badgers when the Survey was started. Fortunately good guidance was available, for the most important signs of the animal were well described in the literature, particularly by Ernest Neal (1948)† in his excellent monograph, and whilst searching the woods it was very satisfying to see in actuality many of the features which I had previously only known in print.

Once shown a good example of a set, the student-mammalogist should

*Or "setts"; either spelling is permissible.

†References to Dr. Neal's monograph are frequent throughout this paper and it may be understood that, unless otherwise stated, it is this 1948 work which is being quoted when that author is mentioned.

have little difficulty in recognising another. Sets are usually sited on slopes, and in the London Area hilly country with woodland was found to be a profitable hunting-ground, the sets being more often located near the edges of wood than in their depths. The sites occupied will be discussed in greater detail later.

The most obvious features of a set are the mounds of excavated spoil. The vast quantities of sand, chalk rubble, flint or other material thrown up are an impressive testimony to the animals' strength and energy. At one Surrey set visited in 1960 fresh sand was found adhering to the wet foliage of a young Oak *Quercus robur** at seven feet above the level of the entrance hole from which it had been dug.

The mounds are often somewhat flattened on top, and where a number of entrances occur along the same level of a bank they form a sort of terrace, carrying a well-compacted path. At some of the larger sets visited several terraces had been constructed one above another, but it was often found that spoil displaced by a very active excavator could block an entrance or two lower down the slope. Over several decades the physical appearance of a Badger-inhabited hillside could change quite appreciably as a result of all these earth movements.

Entrances and tunnels are naturally larger than those dug by Rabbits *Oryctolagus cuniculus*, but since the two species may be living in very close proximity, small holes of Rabbit origin may occur near those made by Badgers, and Rabbit footprints and droppings plainly show that Badger-dug holes are used by these smaller animals. Foxes *Vulpes vulpes* will also occupy Badger sets and leave not only their droppings and prey remains on the terraces but their characteristic odour in the general vicinity.

Some large and apparently excavated cavities may on closer examination be found to have more than one tunnel leading from them, and occasionally an entrance may have been constructed inside the broken base of a hollow tree or tree stump. Holes can also be found which, because of their position and small size seem most unlikely to be entrances, but are obviously connected with the system of underground tunnels and galleries of the set. These serve as ventilation shafts, and Neal describes seeing the movement of leaves covering such a hole which was caused by a Badger sniffing the air from down below.

Entrances in recent use will have their tunnels free of fallen leaves and twigs. There will usually be freshly dug spoil outside, and often a ball of Bracken *Pteridium aquilinum*, grass, straw or other vegetable material dropped when the animal was collecting fresh bedding. Neal also found that bedding was brought out to be "aired", but we were never lucky enough to find an instance of this.

Many Badger-watchers have placed sticks across the mouth of a set, to determine whether or not it was in use, the displacement of the stick by the next morning being taken to indicate proof of occupation. Neal found that this method, by itself, was "unreliable and misleading", for other species of mammal were quite likely to disturb the sticks. He also recounts seeing a visiting Badger push sticks away from four out of a group of five entrances which had been so marked, and go off without entering the set at all!

*Scientific names of vascular plants have been taken from Clapham, Tutin and Warburg (1962).

The instruction sheet issued to Badger Recorders by the Mammal Society in 1962 lists as another possible indication of set occupation, the movements of flies in and out of the entrances. Neal and Harrison (1958) describe how at a breeding set at Camberley, Surrey, on a frosty morning water vapour was seen "rising like steam" from the entrance because of the much higher temperature of the nesting chamber.

Very occasionally a pile of bedding material may be found which evidently forms a nest or bed deliberately built above ground. There is a photograph of one of these under Rhododendrons in the *Sunday Times* booklet on Badgers (Neal, 1962), and John M. Breeds of the Nature Conservancy has shown me colour transparencies of a large pile of bedding also in Rhododendron which he found at Arne, Dorset, in 1964. In the latter case the pile was large enough for a human being to sleep on and the nearest set was over 100 yards away, on the other side of a patch of bog. Llewellyn (1959) found a Badger's "haystack" in Hampshire measuring five feet in circumference and over two feet high. The material was later moved into the set.

I found only two such nests during the period covered by the Survey. The first, at Esher, Surrey, was discovered on April 14, 1960 as a result of following a Badger path on hands and knees for several uncomfortable yards through dense Bramble *Rubus fruticosus* agg. It was an impressive heap of hay with a diameter of about 2 ft. 6 ins. to 3 ft. and a depression in the centre the size of a curled Badger. The second was seen near Cudham, Kent, on September 9, 1962, when in the company of Miss A. Matthews and M. E. Taylor. It was a bed of dried grass in the hollow base of an Ash *Fraxinus excelsior*. The outer trunk wall had broken away leaving a narrow doorway, on the "door-post" of which a Badger's hair was caught.

Outdoor piles of bedding are normally used for sleeping out. Breeding nests above ground have been very rarely recorded, but two have been found in Somerset, one in flat peaty country liable to flooding, and one in a farm shed (Neal and Harrison, 1958, Meade, 1956, and Neal, 1963).

The mounds of excavated debris at a set are worth examining. If chalk has been dug some of the larger lumps may show the marks left by the animals' powerful claws. Mammal bones may be unearthed, including those of Badgers, the stout limb bones demonstrating the great strength of the beast. The Badger's skull is unmistakable, and usually, but *not* always, has the lower jaw still attached. Illustrations may be found in Neal's monograph and Neal (1962). Old bedding may be found, particularly if there has been a recent "spring-clean", and Badger hairs. The latter may also be looked for at the entrance, where the animal may have paused for a good scratch before beginning its nocturnal perambulations. Hairs also get caught in the bark at the base of trees. When looking for hairs the beginner will probably pick up a number of filamentous substances, including fine plant fibres and rootlets. These (and the hairs of several mammals, including man) will break if given a tug, but freshly-moulted Badger hairs have a greater tensile strength and are less easily snapped. In any case the typical, long white-black-white dorsal hairs are easily recognised, and provide the best evidence of a Badger having been somewhere in the vicinity.

Badger hairs at a set, however, do not by themselves provide proof of its occupation, nor when they are found outside a hole of rather dubious appearance should they be accepted as proof that the hole is the entrance to a set. It is likely that, at some time, a Badger may have passed

that way, but even this is not certain. Birds will use Badger hair as lining material. In May 1960 Miss F. E. Duckett and I found a nest of Great Tits *Parus major* in a tree stump in a Kentish hedgerow in which much of the lining material consisted of Badger hair. I have since seen a nest of Jays *Garrulus glandarius* lined with roots and Badger hairs.

It is perhaps worth mentioning that Badger hairs can survive a long time in the open. At a place where a Badger lay dead in August 1964 I was still able to find a few hairs in November 1967.

Trees growing near to sets are worth inspecting. Trunks of those close to entrances will often show claw marks and sometimes mud at a height of up to three feet from the ground, for the animals will use certain trees regularly for cleaning their paws. On disturbed ground outside sets in chalk country Elders *Sambucus nigra* often become established, and their soft bark is easily scored by the Badgers' claws. Other trees in the vicinity may be used by Badgers as "adventure playground" equipment, and may show signs of a good deal of wear and tear. Neal photographed Badgers playing on such a tree in Conigre Wood, Gloucestershire, and one animal was "caught" climbing well up the trunk. At a set at Esher in May 1961 P. A. Morris and D. W. Yalden showed me a sloping tree which had been much used. The bark had been worn off for a distance of 17 feet along the inclined trunk and to a height of 11 feet above the ground. Badger hairs were found at the base of the tree and at nine feet up the trunk.

Millais (1905) gave J. E. Harting credit for having called the Badger the "inventor of the earth closet", and recently used latrine pits are another sign of Badger activity. As Neal remarks, dung pits may be found within a short distance of the set or sometimes a good distance away. They may be as much as a mile off (Southern, 1964). Badgers will defecate elsewhere, of course. I have come across Badger droppings well away from any latrine pit, and P. A. Morris occasionally found droppings in his garden in the centre of Esher. Looking back I now realise that some of the casually deposited and puzzling droppings we found on our early field trips, were in fact Badgers'. It was some time before any of us became experienced coprologists! Since leaving London I have also seen sets where an old entrance hole has been used as a latrine, but no cases of this were noted during the London Area Survey and Neal (1948) regards such behaviour as exceptional.

The more usual latrine pits are relatively small and shallow, and no attempt is made to cover the faeces with soil. The droppings vary in appearance according to the animals' diet, are normally larger than those of a Fox, and can often have a cylindrical appearance. When the Badger has been feeding on earthworms they are very muddy (Southern, 1964), and they can look very black when beetles have been eaten in quantity. Animals which have been feeding in cornfields leave faeces in which husks of grain are clearly recognisable. Neal draws attention to the fact that the cubs are soon taught to use the latrine pits once they begin to come above ground, and the appearance of their smaller droppings can help the observer to establish that they have in fact made their debut into the upper world.

Paths, of up to two feet in width, link the entrances, cross the mounds and terraces, and may lead the enquiring mammalogist to other sets close by, or for considerable distances through the woodland or across adjoining

fields. They are often so well-marked that they may appear to be of human origin, and since for most of their length they may offer the easiest route through the wood they will naturally be used by human beings (and other animals) as well as by Badgers. That they are not really man-made trackways becomes evident when they pass uncomfortably close to the base of a leaning tree-trunk, under a fallen tree which leaves head-room only for a midget, or into a tunnel through a prickly wall of dense scrub. They are often obvious in woodland, especially where they cross a herb-layer of Bluebell *Endymion non-scriptus* or Dog's Mercury *Mercurialis perennis*. Well-established paths can also be traced across grass-land. A. E. Squires (pers. comm.) when studying Badgers in the Charnwood Forest, Leicestershire, traced their paths over fairways of Longcliffe Golf Course by crouching down and noting where the animals had brushed off the early morning dew as they crossed the short turf.

The lowest strands of barbed wire fences are worth searching for Badger hairs left behind by animals passing underneath.

When following a Badger path one often notices places on either side where the leaves on the woodland floor have been disturbed as though with an enquiring nose. I presumed that these had been made by Badgers grubbing for food in the leaf litter, and called them "snuffle holes", a name I had never seen in print but which I later found being used by Badger enthusiasts elsewhere in the country.

Hager (1957) describes the evidence left when Badgers have been digging out the nests of bees and wasps. When bees' nests are dealt with one finds a "neat hole, approximately six inches wide by six to eight inches deep, with traces of comb and dead bees in the bottom of the hole". The extraction of wasps' nests involves more digging, the soil and stones being thrown "in a straight line for a distance of three to four feet from the nest" leaving a hole often as much as a foot wide and up to a foot deep. Small bits of comb, dead wasps or live wasps may be found in the bottom.

Other food remains may be seen; the everted skin of a Hedgehog *Erinaceus europaeus*, piles of Yew *Taxus baccata* seeds (Sankey, 1955), crushed snail shells and the remains of windfall apples. Near some Kentish sets we found the hoods and spadices of Lords and Ladies *Arum maculatum* bitten off. It was presumed that Badgers might have been responsible but I have not read of similar cases.

Badger footprints may be found in the bare earth at a set entrance or on a muddy path. The Badger, like other members of the Mustelidae, has five toes on each foot, and even though the smallest of these may not always leave a clear impression, the arrangement of the other four toe prints, more or less in line with each other, makes the tracks readily distinguishable from those of a Fox or the average dog. In the canine/vulpine foot the tips of the two middle toes project beyond those of the other two, producing in the case of the Fox, and most dogs, a more diamond-shaped print. In a good Badger print the claws leave very clear marks.

Further discussion of Badger tracks and their interpretation is covered by Neal, Leutscher (1960), and Lawrence and Brown (1967). Only occasionally will really clear tracks showing all the salient features be found. Around a set the tracks of several different animals (often members of different species) may be mingled and superimposed one on the other, and in chalky country footprints may be little in evidence.

Anyone keen enough to search for any of the signs of Badgers already mentioned will, of course, want to enjoy the experience of seeing the

animals themselves. He or she will find all the advice that is needed in the literature (Neal, 1948 and 1962) and there is nothing I wish to add. It may be an extraordinary confession to make, but although I inspected 158 sets in daylight during the course of the Survey, I made only about half a dozen nocturnal visits. This is partly explained by the fact that my home was inconveniently distant from any set, but another very important reason was that I was afraid of becoming addicted to the cult of brock-watching. Time was limited, and had I succumbed the Badger Survey of the London Area would have been even more incomplete than it is.

SURVEY METHODS

The composition of the Survey team varied as the years passed, but at the outset it consisted of myself and a few enthusiastic members of the Young Naturalists' Section. We started by investigating some of the areas from which Badgers had been recorded by Fitter (1949) and places which individual members of the team knew to be inhabited by Badgers. Once a profitable area was discovered we concentrated on it, and on the next field visit extended the search to similar terrain which lay immediately near by. Twice the Youth Hostel at Cudham, Kent, was used as a convenient base.

Occasional appeals for help on these "Brock and Tod excursions" as they were called (we were investigating the distribution of the Fox (Tod) at the same time) were made in the Young Naturalists' *Bulletins* and at indoor meetings of the Society, but few new helpers were recruited and the team remained a small one.

Wooded hillsides readily accessible by means of public footpaths were examined for sets. Fortunately the Kentish and Surrey countryside bordering South London is good rambling country, with well sign-posted and well-used footpaths and bridleways, and many public open spaces. Fortunately too, public transport services in such an area were also good, enabling young and impecunious participants to reach a prearranged rendezvous from widely scattered parts of the London Area.

The edges of woods were searched for sets, and anything that looked like a Badger path followed. Neal and Harrison (1958) define a set as "a series of tunnels and entrances which are interconnected". We had (without having then read the paper in question) come to a similar conclusion. Of course, it was difficult to decide at times whether one group of holes was really quite separate from the next. It is known that tunnels can run for a great distance. Neal mentions a Badger's chamber found more than 60 yards from the nearest entrance, and quotes Thompson (1931) who knew of one that ran for a hundred yards to the other side of a hill. It is quite possible, in fact almost certain, that some of the separate groups of holes which we recorded as separate sets may have been part of one set, just as it is equally certain that other people working on Badgers may have recorded as a set what Neal and Harrison (*op. cit.*) would call a *community*, "a single set . . . or several sets rather near together which are occupied at various times of the year by the same badgers".

When a set was found the following details were recorded in a field note book:—

- (i) the location of the set, i.e. the name of the locality, that of the nearest village, etc., and the type of site, e.g. whether it was on a hillslope, a bank, etc.;

- (ii) a six-figure National Grid reference;
- (iii) the altitude above sea level. (Use of the $2\frac{1}{2}$ ins. O.S. map made it possible to give this to the nearest 25 ft. contour);
- (iv) a note on the geology;
- (v) the vegetation in the neighbourhood of the set: tree layer, shrub layer, herb layer.

A rough sketch was made of the set, showing the position of magnetic north, the direction of the hill or bank slope (if the site was on an incline as most of them were), the disposition of the entrance holes, often with the distances between them measured in paces, the route of obvious Badger paths, and the position of any important features such as dung pits, ventilation holes, scratched trees, and recognisable landmarks like field boundaries, buildings, large trees, watercourses, etc. The entrances were lettered on the plan A to Z, and if there were more than 26 holes, the second series was designated A1, B1 and so on. Entrances were classified into three groups; (i) those open and apparently in recent use (shown on the plan as open half circles), (ii) those which were still open but which had accumulated a certain amount of leaf litter, twigs, etc., and had apparently not been used recently (shown as half-circles each bisected by a black bar), and (iii) entrances which were completely blocked and would need re-excavating if they were to be brought into use again (shown as black half-circles). The position and (very roughly) the relative size of the mounds of spoil were shown, and notes made of anything of interest found at any particular entrance hole, e.g. bedding, Badger hairs, Rabbit droppings, the smell of a Fox. Photographs were sometimes taken if the conditions were suitable.

Some of the more elaborate sets, e.g. one on Wimbledon Common, Surrey, were mapped with the aid of lengths of string and a measuring tape. A large set could often occupy a group of people for well over an hour.

Fair copies were made of the field notes, with one sheet or more devoted to each set. Each set was given a reference number based on the 1 km. square in which it was situated, and the record sheets filed numerically under counties. Photographic prints were mounted on the appropriate pages. The full records will be deposited with the L.N.H.S. after copies of the record sheets have been made for the other County Badger Recorders appointed by the Mammal Society.

The sort of habitat data we set out to collect proved to be more or less what the Mammal Society was later to ask the participants in the National Survey to obtain.

Other information on Badgers in the London Area was collected, of course, at the same time as the mapping of sets was in progress—records of animals seen away from the sets, road casualties and other facts which would help to build up some sort of picture of the animal's status.

My own field activities were concentrated on north-central Surrey and west Kent, with only occasional visits north of the Thames. In west Kent I was greatly helped by members of Lewisham Natural History Society, particularly K. White, P. C. Tinning and V. Green. South-west Surrey was covered very thoroughly by the two-man mammalogist team of P. A. Morris and D. W. Yalden. In this part of the Society's Area there are many large estates which are not accessible to ordinary members of the public, and permission had to be sought from many land-owners, most of whom were remarkably co-operative. It was found, however, that in some quarters there were feelings of hostility towards Badgers, and

for this reason I did not give the Survey wide publicity or make any enquiries amongst keepers or those concerned with sporting interests. One Surrey landowner assured two Badger-seekers that there were no such animals on his property and that his keeper would have soon dealt with them had any appeared. It was thought inadvisable to tell him that he had in fact already got Badgers and had probably had them for years!

RESULTS OF THE SURVEY

(i) *Distribution*

One of the objects of the Survey was to obtain a picture of the Badger's range in the London Area (a circle of 20-mile radius from St. Paul's Cathedral), and compare this with the last account of its status as given by Fitter (1949).

The total number of sets visited and described over the 1959-1964 period was 164, but at least another 110 are known to have been in existence and the actual number of sets in the Area was probably much greater than this. That most of the field work was carried out south of the Thames is apparent from the distribution map (Fig. 1), but there can be little doubt that the Badger is more numerous and of more general occurrence in the Kent and Surrey sectors than it is in those parts of the Society's Area north of the river. Most of the tables in this paper are based on information obtained in Kent and Surrey because insufficient data was obtained from the other counties.

The North Downs were specifically mentioned by Fitter (1949) as being an area rich in Badgers, and, during the Survey, sets were found throughout most of the suitable parts of the range, from the River Mole in the neighbourhood of Mickleham, Surrey, to the east side of the Darent Valley in Kent. Along the south side of the Downs many of the sets were dug in Clay-with-flints usually to the Chalk strata beneath.

In north-east Surrey the Esher, Cobham and Weybridge district holds a good population, the animals here excavating the Bagshot Sands, Claygate Beds and Pleistocene drift. Nearer London the Badgers of Richmond Park mentioned by Collenette (1937) and Fitter (1949) are more than holding their own. The Conservators of Wimbledon Common are justly proud of the Badger sets under their protection (Anon., 1967), and there are other sets on golf courses and other private property in this neighbourhood. Sandy, pebbly drift capping the stiff refractory London Clay makes it possible for the Badger to find suitable places for set excavation, particularly at Wimbledon where the deposits are more extensive. Two Surrey sets were found actually dug into the London Clay, one of them at Bookham Common. This discovery lent more significance to a Bookham Common record Dr. Geoffrey Beven submitted in 1956, of a Badger's skull mounted on a stick which had been thrust into the ground at Hill House Wood. A dead Badger was found beside the railway at Bookham in 1963.

Some of the wilder open spaces of the Borough of Croydon also provide living space for Badgers. Most of the sets have been dug in sand, and it is interesting to note how, here and there, the upper limit of excavation is the junction of the easily-worked Woolwich and Reading Beds with the pebbly Blackheath Beds which overlie them. Badgers live here within the limits of suburbia. That there are others which manage to survive even closer to the centre of the capital has been mentioned by Neal, and I agree with him that the less said about them the better!

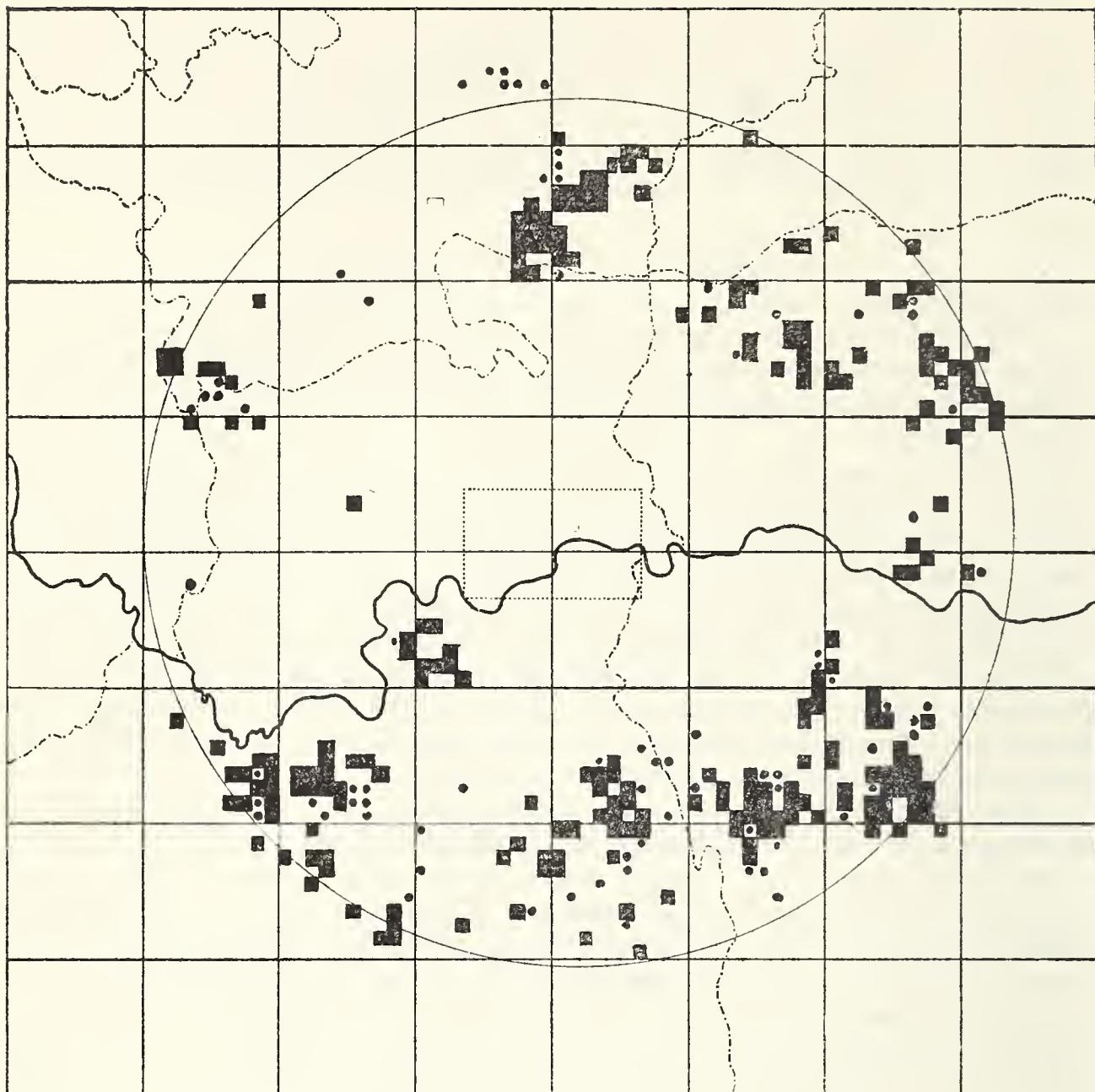


FIG. 1. Recorded distribution of the Badger in the London Area since 1959. Black squares indicate 1 km. grid squares from which animals were recorded between 1959 and 1964; spots indicate those from which records have been obtained since 1964.

Badgers have not recolonised the Royal Botanic Gardens at Kew, from which the last occupant was evicted in about 1913 (Fitter, 1949), although in 1966 it was reported that one had been seen on adjoining land about six years before (P. A. Morris, *in litt.*). (This record has not been mapped, since the 1 km. grid square is not known). I could find no signs of Badgers in another Surrey locality mentioned by Fitter (*op. cit.*), Nonsuch Park, Ewell, where they lived in the 1920s.

On the Kentish North Downs the country around Cudham, Downe and Pratt's Bottom, the slopes on both sides of the Darent Valley and the dry chalk valleys between Otford and Kingsdown were found to be well populated, and a diligent search made more recently by R. V. White (L.N.H.S. records) confirmed suspicions that we only saw a small proportion of the sets in this district. Neal's 1948 map suggested an absence of Badgers from north Kent, but it was found that, north of the Downs,

the Woolwich and Reading Beds and Thanet Sands presented similar habitat conditions to those around Croydon. Such areas were well colonised, especially between Sidcup and Farningham. Edwards (1960) mentions a set at Footscray Place, Sidcup, which was occupied until at least 1953. At that time it was probably the nearest to the centre of London in this south-east quarter. I was unable to confirm the continued presence of Badgers at Elmstead Woods or at Sundridge Park, mentioned by Fitter (1945 and 1949). Rigden (1955) and Burton (1962) did not record the Badger in this part of metropolitan Kent.

Table I shows the distribution of 150 sets examined in Kent and Surrey in relation to the geology. (There are, of course, many more sets on the Surrey Chalk than it suggests).

TABLE I

Deposits excavated by Badgers in Kent and Surrey sectors of the L.N.H.S. Area

Rock	Number of sets		
	Kent	Surrey	Total
Sand and gravel (Woolwich and Reading Beds, Bagshot Beds, Claygate Beds, etc.)	15	69	84
Chalk	33	12	45
Clay-with-flints	12	7	19
London Clay	—	2	2
TOTALS	60	90	150

Since the creation of the Greater London Council, the administrative county of Middlesex has ceased to exist, but for recording purposes the Watsonian Vice-county of Middlesex must still be recognised. Middlesex, most of it flat, on clay soil and heavily built over, has little to offer Badgers, and in 1948 Neal considered it the one county in England that probably lacked them.

They have certainly disappeared from a number of localities, and many of these can never be reoccupied. Millais (1905) mentions Badgers at Dollis Hill, Willesden, where it would be quite impossible for them to live today. Fitter (1949) stated that they were present at Moat Mount, Mill Hill until 1933, but when I visited this place with the Young Naturalists in January 1960 we could only find evidence of Foxes. Nor have I been able to obtain any *proof* of the continued existence of Badgers at Kenwood, Hampstead, in spite of the occasional rumours of animals seen and the claims made in a number of guide-books.

There were certainly inhabited sets at Kenwood at one time, and the habitat is still, in one respect, a suitable one; the London Clay is here overlain with deposits of Bagshot Sand. The Earls of Mansfield, who once owned the property, protected the animals (Millais, 1905), but the wood was opened to the public in the 1920s, and Fitter (1949) quotes Johnson (1930) as saying that the set or sets were deserted before 1925. If that is true, then others must have taken the animals' place at a later date, for Badgers were certainly present in the succeeding decade. In March 1934 John Markham (*in litt.*), together with a keeper and a naturalist friend, E. G. Brown, saw a great heap of freshly-dug soil outside an

old Fox earth. It was covered with Badger footprints, as was the mound by a second hole dug a few days later. Mr. Markham obtained permission to stay in the wood after closing time, and saw two Badgers emerge from one of the holes. A keeper told Mr. Markham that cubs had been seen in previous years, but as far as is known none was recorded in 1934. The head-keeper saw a Badger in the wood on two occasions in 1938 (Fitter, *op. cit.*).

Taylor (1962), writing of the mammals of Hampstead Heath, was convinced that Badgers were absent from Kenwood and the rest of the Heath, and Miss K. E. Springett, who has continued observations on the birds and mammals since then, has been unable to obtain any conclusive evidence of the presence of Badgers. Whilst investigating past records, however, Mr. Taylor (*in litt.*) came to hear of a Badger found, in 1957 or 1958, lying dead under a seat close to the East Heath Road, near the lower fairground. Unfortunately the body was buried by the London County Council staff before any naturalist had an opportunity to examine it, but enquiries have established that it was indeed a Badger. It showed no obvious signs of injury, but could still have been a road casualty which someone had removed to the road verge. Badgers killed on the road often show little or no sign of external damage. We are left wondering, however, whether the Hampstead animal was really killed near where it was found, and if so whether it was an escaped pet, a locally resident Badger or a wanderer from more distant country. It could, of course, have died elsewhere and been deposited at dead of night, perhaps by a practical joker who wanted to confuse the records. Stranger events have occurred at Hampstead before. Fitter (1949) mentions the mysterious appearance of a Common Seal *Phoca vitulina* in the Vale of Health Pond in 1926!

It is just conceivable that Badgers may still be living on private property in the Highgate area, and that this might account, not only for the East Heath Road incident, but for the confidently-worded but secondhand reports of Badgers which appear from time to time in journals and newspapers. Whiting (1912) stated that Badgers moved to Kenwood from Bishops Wood, most of which was to disappear when the developers turned their attention to the area between the wars. It is possible that there were other inhabited sets in the neighbourhood which were never recorded, and that suitable sites may still exist in large wooded gardens. Mr. Taylor (*in litt.*) feels, however, that if Badgers are still found here, there would by this time have been a number of reliable sight records and reports of road casualties, for the animals would almost certainly have left their private retreats to seek at least some of their food on the Heath.

If Badgers really have survived in the Hampstead/Highgate district, then their protectors, whoever they may be, deserve nothing but encouragement, and one should not pursue the matter further. It is to be hoped however, that some good documentary record is being kept for posterity.

There is another part of Middlesex from which a few more firm facts would be welcome—Perivale Wood, the Selborne Society's Bird Sanctuary. Signs, considered to have been those of Badgers, have been reported intermittently from this area since 1961, and E. Dawson (*in litt.*) has described seeing a Badger on the canal towpath near the wood in the early morning on 3rd May, 1964. He has discounted the claims that have been made that there is a set in the wood, and considered his animal to have been a wanderer.



Photo by P. A. Morris

Wild Badger feeding on scraps in a suburban garden, Esher, Surrey, with Hedgehog in background, October 1962.



Photo by W. G. Teagle

Badger path leading to dense cover, Esher, Surrey, April 1960.



Photo by W. G. Teagle

Excavated sand outside a set entrance, Esher, Surrey, April 1960.

Perivale Wood is on the London Clay. This does not by itself mean that Badgers are unlikely to be resident, but the locality does seem rather isolated from places where the animals are present in good numbers. It is tucked well into the Middlesex suburbs, at the foot of Horsenden Hill, and although a green corridor following the Grand Union Canal links it with more open country, that country is rather flat, unwooded, and apparently Badgerless.

It is in the north-west of the Vice-county and along its northern and western boundaries that the Badger survives as a Middlesex mammal. There are sets on the Woolwich and Reading Beds near Harefield, and others on the Chalk, just over the boundary in Hertfordshire, near Rickmansworth. Pickess (1964), besides mentioning these, refers to one in use in 1962 near Denham, Buckinghamshire, and I understand (B. P. Pickess, pers. comm.) that several more sets have been found in this part of the Colne Valley since work on the Survey finished.

South Mimms and Potters Bar are two localities on Fitter's Middlesex list which are now officially in Hertfordshire. A set reported from Ridge in 1964 raised hopes of continued activity near the first of these, but no signs of it could be found when the area was visited in 1969. But Badgers certainly occur just east and north-east of Potters Bar. An account of the Badgers in and around Northaw Great Wood in the neighbouring part of Hertfordshire has already been published (Clark, 1966), and investigations in progress towards Welwyn Garden City, Hertford and Hoddesdon in the north and north-east have already shown that the hilly, well-wooded country in this part of the county maintains a large number of sets. Early in 1969 the presence of Badgers was also confirmed at Radlett, well to the west of this well-favoured area (Michael Clark, *in litt.*). Since my field experience of Badgers in south-east Hertfordshire was limited to one visit to the sets in Northaw Great Wood with Bryan L. Sage in 1961, and very few records were received from members in this part of the Society's Area, I am more than grateful to Mr. Clark for his help.

Similarly, very few reports of sets were received from our members living in Essex, although both Fitter (1949) and Scott (1960) showed that parts of this sector of the L.N.H.S. Area held a good population of Badgers. I was only able to make a few field visits, and these were usually to look at sets already mentioned in the literature. My examination of apparently suitable territory elsewhere in the county usually proved fruitless and frustrating, and but for the welcome help recently given by W. W. Page, R. A. D. Cowlin and D. Chapman of the Essex Field Club, the north-east quarter of the distribution map might only have shown a few isolated and very well-known localities.

The long list of four-figure references kindly supplied by Mr. Page in 1968 shows in fact that Badgers occur over most of the country between Epping Forest and the boundary of the Society's Area running from Chipping Ongar to the south of Brentwood. There are more further south, in the neighbourhood of Purfleet, Aveley, Ockendon and Grays, and there is also a record of a set at Harlow in the extreme north. This last is close to Parndon, one of the very few Essex localities mentioned by Fitter (1949) for which there does not appear to be a recent record. The old site or sites may well have been destroyed when Harlow New Town was built.

It is not possible with the information at present available to establish the exact relationship between Badger distribution and surface geology in south-west Essex, but sandy or gravelly soils are clearly the most favoured. In four of the occupied districts, Epping Forest, Hainault Forest, Havering-atte-Bower, and a complex of localities centred on Brentwood, the London Clay is capped with the sands of the Bagshot and Claygate Beds. Nearer the Thames, disused gravel pits in the Boyn Hill and Taplow Terraces provide suitable sites. At Grays, where there is a Chalk outcrop, it appears that sets are dug in the sandy overburden rather than in the Chalk itself. Dent (1922) stated that Badgers were "very numerous" in this area and at Tilbury.

Several of the old sets in Epping Forest now appear to have been deserted. The one near High Beach church mentioned by Fitter (1945) was apparently abandoned years ago, and Scott (1960) said it was "almost hidden by undergrowth". There were balls of bedding and other signs of activity at one of the three sets at Loughton Camp when I visited them in November 1959, and Scott (*op. cit.*) saw cubs there. The site appeared disused in January 1962, however, and in 1968 Messrs. Page and Chapman (*in litt.*) classed it as "inactive". Similarly the once very busy set near Broadstrood Lodge appears to have been unoccupied since at least 1960. Scott (*op. cit.*) mentions other derelict sets in Fairmead Bottom and behind the Wake Arms, but did not think conditions in the Forest were as depressing as this catalogue of deserted sites suggests. He considered that the Badger was holding its own, and added that there were sets on private land just outside the Forest limits where it continued to breed. R. A. D. Cowlin (*in litt.*) feels that the situation has since deteriorated, and now gives cause for concern.

Although much of the Society's Area has yet to be properly examined, it is already apparent that the Badger occurs wherever conditions are still suitable, its distribution to a great extent dependent on certain geological and physiographical features of the countryside. The sands of the Bagshot, the Claygate, and the Woolwich and Reading Beds, and the Chalk of the North Downs and the Colne Valley would seem to provide ideal sites, while the London Clay areas usually have little attraction except where there are superficial deposits of sand or gravel.

The map (Fig. 1) shows the 1 km. squares in which sets have been located or where other signs of wild Badgers have been noted. In order that a more up-to-date picture might be presented, the map indicates not only Badger distribution *as known* at the end of the 1959-1964 Survey period, but those squares from which the species was reported after 1964. Several of the sets in these "newly" recorded areas were, of course, of many years' standing and would have been in existence at the time of the Survey.

As with most distribution maps of this sort, a blank square does not necessarily mean that the species was absent, although it is safe to say that Badgers would normally avoid the *densely* built-up areas. A less adaptable animal than the Fox, the Badger is unlikely to prove a very successful urban colonist. Occasional wanderers have been noted, like the one once reported seen on Putney Bridge (Dr. Ernest Neal, *in litt.*). This animal could, of course, have made its way from Wimbledon Common or Putney Heath. It is harder to explain how one came to be found dead in Ennismore Gardens, South Kensington in May, 1947 (Fitter, 1949), or the origin of the Badger which four policemen saw using a pedestrian

crossing in Clapham High Street at 3 a.m. on May 2, 1967 (L.N.H.S. records). Mention has already been made of another mysterious occurrence, at Hampstead.

Although any record of a Badger found dead or alive near the centre of London must cause one to consider the possibility of its being an escaped pet, the position is different in the suburbs. There are several instances, which will be discussed later, of Badgers frequenting suburban gardens, and of sets surviving on private land which has become more or less surrounded by building development.

(ii) *Altitude*

Although Badger sets have been seen at heights of 1,700 feet (Southern, 1964) and even at 7,000 feet in Persia (Neal, 1948), they may also be found close to sea level. Two I have seen, one at Woodwalton Fen, Huntingdonshire and another, in Kent, in the exposed, grassy banks of the Royal Military Canal at the edge of Romney Marsh, were both below the 25 foot contour. These records are quoted to show that one should not take a casual look at an expanse of country and decide that it can hold no Badgers on the grounds that it is too low-lying or insufficiently wooded.

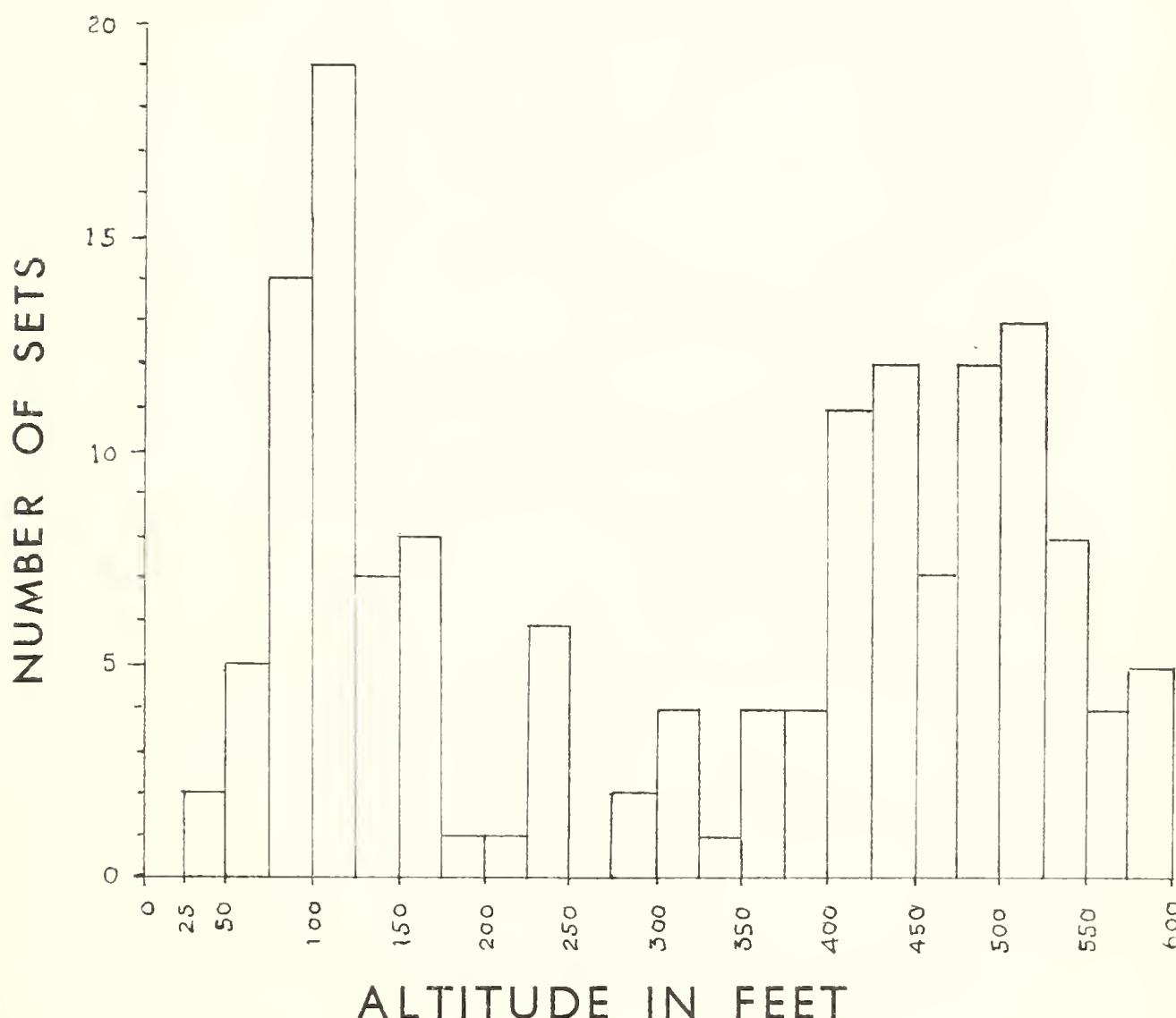


FIG. 2. Altitudinal distribution of 150 sets examined in Kent and Surrey sectors of the L.N.H.S. Area.

Neal states that Badgers are most commonly found at altitudes of between 100 and 600 feet. Of a total of 177 London Area sets for which relevant information is available, 156 were found between these limits, while 21 were below 100 feet. None examined was situated below 25 feet or above 600 feet, although there is a good deal of land between 600 and 700 feet in the Area south of the Thames. Fig. 2 gives a breakdown of the information collected in the Kent and Surrey sectors, where nearly 50 per cent. of the sets were between 400 and 600 feet.

(iii) *Habitat*

The Badger is usually considered a woodland animal, and it is therefore hardly surprising that most of the London Area sets were found in woods. The size of the wood did not seem to be important, nor did its composition, apart from the fact that pure stands of conifers were less likely to be inhabited. In many cases sets were situated at or near the edges of woods or copses, close to open grassland—farm pasture, parkland, uncultivated chalk downland, garden lawns, greens and fairways, and, in one area, a race-course. Entrances were sometimes found well away from any tree cover, and on rare occasions entire sets were similarly exposed. This acceptance of open situations may at times have been the result of "population overspill", as in two large adjoining Surrey gardens where an enormous set "overflowed" from a sandy wooded slope to a level expanse of rough grass at the foot of the incline and to a flat field at the top.

We found tree-lined hedge-banks worth examining for sets, especially in Kent and north-east Surrey, where they were often extensions of only slightly broader strips of woodland. These wooded field boundaries can boast a variety of trees, including Elder, Ash, Oak, Maple *Acer campestre*, Hazel *Corylus avellana*, Hawthorn *Crataegus monogyna* and Beech *Fagus sylvatica*, and they must be an important refuge for many other animal species besides Badgers.

Very large gardens and the grounds of such institutions as colleges, hospitals and homes of rest provide accommodation for Badgers, and there are more that do so in the London Area than Table II suggests. The people who share the property with the animals usually appreciate their presence and keep fairly quiet about it. Any damage they do is tolerated.

TABLE II
Habitat Location of Badger sets in the London Area

Habitat Type	No. of sets found
Woodland	151
Grounds and gardens	20
Hedge banks	18
Golf courses	7
Road and railway embankments and cuttings	7
Parkland	5
Gravel pits	5
Fields	4
Rubbish dumps	2
Stream bank	1
Orchard	1
TOTAL	221

Badgers also make use of such features as road banks, railway cuttings and gravel pits, and two sets were on rubbish dumps.

Most observers gave some description of the habitat when reporting a set, and Table II is an attempt to classify those for which sufficient information was provided, a total of 221. The habitat types are not as clear cut as one would like them to be. All of the "grounds and gardens" for example were to some extent wooded, there were small patches of woodland on most of the golf courses, and Elder scrub on the disused gravel pits. The term "parkland" has been used to describe large grassy landscaped areas with widely scattered mature trees. Bracken-dominated heathland in the process of being colonised by Birch *Betula* spp. has been classified as "woodland".

The types of woodland in which sets were located in Kent and Surrey during the period covered by the Survey are shown in Table III.

TABLE III

Types of Woodland in which sets were located in Kent and Surrey, 1959-1964, in Order of Frequency

Tree Species	No. of sets		
	Kt.	Sy.	Total
Oak	7	13	20
Beech with Yew	16	2	18
Oak with Birch	1	8	9
Birch	—	8	8
Beech with Oak	1	6	7
Yew	5	2	7
Beech	6	—	6
Birch with Sweet Chestnut <i>Castanea sativa</i>	4	—	4
Maple with Hazel	3	—	3
Oak with Sweet Chestnut	1	2	3
Beech with Maple	3	—	3
Beech with Ash	2	—	2
Sycamore	—	2	2
Birch with Scots Pine <i>Pinus sylvestris</i>	—	1	1
Sweet Chestnut (pure coppice)	1	—	1
Very mixed broad-leaved woodland	1	6	7
TOTALS	51	50	101

The much-quoted statement that sets are usually on slopes undoubtedly influenced our methods, and hillsides, especially wooded hillsides were certainly given more attention than level ground. It should have been realised right at the beginning, however, that more or less level sites are also used, for the very first set to be examined by a Young Naturalists' party was in such a situation. This was the celebrated set at the southern end of Sidmouth Wood in Richmond Park, which we visited by kind permission of the (then) Ministry of Works and the Park Superintendent, Mr. G. J. Thompson. Had not the precise position of this set been already known to some of us we might well have looked elsewhere than amongst the Bracken in this flattish bit of open Birch woodland.

The vast majority of sets (over 70 per cent. in Kent and Surrey) were on sloping ground, and sometimes the inclination was almost precipitous.

Often, however, the animals took advantage of minor irregularities of the land surface, as for example tree-lined hedgebanks in country where the general contours were not particularly steep. Contrary to our expectations, the direction in which the slope faced did not seem to be of much importance. Of a total of 105 sets on sloping sites in Kent and Surrey 16 per cent. had a northerly aspect, 21 per cent. southerly, 31 per cent. easterly and 32 per cent. westerly. In Kent, however, 47 per cent. of the sets faced east as compared with only 16 per cent. in Surrey. Only 4 per cent. of the Kentish sets faced north, but 27 per cent. did so in Surrey.

One item of ecological information required by the Mammal Society was not always taken into account—the details of the nearest water supply. Neal found that the sets in Conigre Wood were situated at a reasonable distance from the River Churn and that paths led down to this water, presumably made by Badgers going to drink. B. P. Pickess, W. E. Minnion and I found a well-beaten track across a field from a Hertfordshire set to the Grand Union Canal, and sometimes the location of the nearest water supply was obvious, as in the case of a number of sets dug in the steep banks of the River Mole. Often, however, there did not seem to be any water near at hand, especially where sets were situated on the slopes of dry valleys in the North Downs. In such places the only drinking places seemed to be the temporary pools of rainwater which collected on trackways, in hollows between root buttresses or between two or more trunks of the same tree. Hager (1957) found that in the Chilterns there was no water at or near many of the sites occupied by Badgers, and Squires (1963) also came to the conclusion that in Charnwood Forest the close proximity of drinking water was not an essential requirement.

(iv) *Size of sets*

The largest set seen during the Survey, stretched across two large gardens and, in April 1960, there were 79 entrances, over 30 of which appeared to have been in recent use. Whether this represented several sets which had become joined up it is impossible to say, since the history of the place is not known. There were *in addition*, in the same two gardens and an adjoining field, another 24 holes in eight widely separated groups, and some of these were also occupied. Most of the main set, if something so large can be adequately described as such, occupied a narrow, 200-yard-long strip of woodland on a steep sandy bank, with most of the entrances roughly arranged in two long lines. The amount of excavated sand suggested a vast population of Badgers, but in fact no more than nine animals were ever seen on any one occasion. Sets of this size, of course, are difficult to watch, but the observations here of P. A. Morris and D. W. Yalden, made over a number of years, would seem to support Neal's opinion, that very large sets do not necessarily mean large numbers of occupants.

Sand is more easily worked than other rocks, and of the 12 sets found with 20 or more entrances, nine were in sand—two sets each of 21 holes, two of 26, and one each of 20, 27, 41, 44 and 79. One Chalk set on the North Downs had 25 entrances, and another on the Downs, in Clay-with-flints, had 31. The twelfth was of 20 holes, dug, surprisingly enough, in London Clay.

Most sets were much smaller; the majority had less than six entrances. Table IV is compiled from information from 146 sets in Kent and Surrey.

TABLE IV

Size of sets found in Kent and Surrey, 1959-1964

No. of entrances	Number of sets		
	Kent	Surrey	Total
1-5	40	48	88
6-10	11	13	24
11-15	6	9	15
16-20	—	8	8
21-25	—	4	4
26-30	1	2	3
31-35	—	1	1
36-40	—	—	—
41-45	1	1	2
Over 45	—	1	1
TOTALS	59	87	146

RELATIONSHIP WITH MAN

Man has only recently started to take a humane and intelligent interest in carnivores. Over the centuries he has thought up various reasons for killing them, many of them ecologically unsound. Badgers have long been persecuted in Britain, and in the 19th century a person who showed them any sympathy may well have been regarded as a crank. Harting (1888) quotes a case of Badgers being protected by someone in Leicestershire "solely for the pleasure of studying their habits" as "*an experiment unique of its kind*"; (my italics). Bucknill and Murray (1902), commenting on the animal's status in Surrey, said that "as a rule little mercy is shown to this poor beast if a chance is obtained of shooting it or catching it or even . . . running into it with a pack of hounds".

The Badger was killed for its hair, its grease (said to cure rheumatism and other ills), and its hams, which were smoked and eaten—and still are occasionally in some parts of England. But it would appear that most Badgers were killed simply because they were Badgers and thought to be harmful. They were also caught alive to provide "sport", and, chained to a box or barrel, were baited with dogs, the dog owners betting on the results of the contest. Alfred Brett, in an address delivered to Watford Natural History Society and the Herts. Field Club in June 1877, mentioned an old man at Aldenham who had been a kind of purveyor of Badgers for baiting. Animals were also taken from the "Badgers' Dell" on the Cassiobury Estate, near Watford, and sold to a publican at Croxley Green for this purpose (Brett, 1878).

Badger baiting was made illegal in 1835, but, as Neal says, it is still practised secretly. Badger "digs" at which animals are killed are a common occurrence. Ruth Murray (1968), making a plea for the legal protection of the Badger, condemns these activities, which she says often afford the participants the opportunity to test their Jack Russell terriers and, "under circumstances which are usually free from any humane supervision and restraint", deliberately bait the unfortunate victim. Badger "digs" are still held for "sport" in Surrey, even, I find, within the Society's Area.

Nineteenth century attitudes and prejudices die hard. In Middlesex a deliberate killing took place in a nature reserve in 1966. Less than a year after the Middlesex and Hertfordshire Trust for Nature Conservation

assumed responsibility for the management of part of Bayhurst Wood, Harefield, a malevolent person waited at the set and shot two Badgers through the head (S.E. Crooks, *in litt.*).

Neal gives several sad illustrations of the popular ignorance of the animal that existed 20 years ago, but I venture the opinion that the situation has improved a little, with film, radio, television and Dr. Neal's own writings helping to create a more favourable climate. The Harefield incident was given full coverage in the local newspaper *The Advertiser and Gazette*. A Victorian editor would have dismissed such a story as a case of "dog bites man".

On March 25, 1965, a one-day conference, suggested by the Fauna Preservation Society and organised by the Council for Nature, was held in London to consider the impact of British mammalian predators on agriculture, forestry, inland fisheries and game management. The conference was attended by conservationists, gamekeepers, landowners, foresters, agriculturalists and sportsmen, and the proceedings were published in *Oryx* in August 1965. It was unanimously agreed that the Badger was "an almost wholly beneficial animal". These opinions had already been expressed by Neal in his 1948 monograph and by Lancum (1951) on behalf of the Ministry of Agriculture, Fisheries and Food, but at that time it would have been less easy to have gained such support from representatives of so many different interests.

It would, of course, be idle to pretend that the Badger can do no wrong in Man's world. The Council for Nature's 1967 publication *Predatory Mammals in Britain*, prepared in association with the British Field Sports Society, the Fauna Preservation Society and the Game Research Association as a result of the 1965 conference, mentions poultry killing, damage to standing corn and Rabbit-proof fencing, the consumption of grain and game-birds' eggs, and the Hunt's need to prevent Foxes from seeking sanctuary in Badger sets. The booklet makes it clear, however, that in moderate numbers Badgers did little harm and quite a lot of good, especially by destroying small rodents and wasps' nests. Only under special circumstances was any sort of control really necessary.

Charges against the Badger were discussed by Lancum (*op. cit.*) and Neal. They agreed that occasional "rogue" animals killed poultry, but that there was very little to substantiate the claim sometimes made that they also destroyed lambs. The evidence was very slender indeed; to use Lancum's words, it was "so flimsy as to be practically non-existent". The Council for Nature *et al.* considered it could be disregarded as a normal hazard.

During the course of the London Area Survey it was learned that a few people objected to the animals digging up their lawns, and that some damage had been caused to the race-track at Sandown Park, Surrey. Wire netting round plantations in Richmond Park suffered damage through Badgers digging underneath it and forcing it up, but the authorities followed the Forestry Commission's advice (Neal, 1955) and installed swinging "Badger gates". These, if properly designed, will admit Badgers, but are too heavy to be pushed open by Rabbits.

In Hertfordshire, Clark (1966) found that farmers and gamekeepers in the neighbourhood of Northaw Great Wood were "prepared to tolerate" the Badgers. Although crops were sometimes flattened and the sets could provide breeding places for Foxes, it was reckoned the animals really did more good than harm. Scott (1960) noted more toleration in Essex

than once existed, but there were still those who persisted in the "persecution of any animal which lives in a burrow". In the Esher district of Surrey P. A. Morris and D. W. Yalden found most landowners sympathetic, but in another part of the same county in 1961 it was necessary for an official body to register a strong protest with a local authority for allowing an employee to destroy Badgers in a woodland bird sanctuary! There appeared to be no good reason for the action, and the control method used, gassing, was in any case illegal.

It is encouraging to find that so many other people have found more civilised ways of making contact with London's Badgers. The March 1962 issue of *Essex Countryside* contained a photograph of a Badger which visited a garden in Harold Wood to feed on kitchen scraps, and in the same year P. A. Morris began to entertain one in his garden in Esher. In 1960, Badger-feeding housewives in one South London borough had a system by which they could let their neighbours know when the visitors arrived, so that more than one household could enjoy the evening's performance.

When a house in Weybridge, Surrey was up for sale in March 1962, the owners Mr. and Mrs. D. M. Watson, expressed their hopes (*Daily Mail*, March 5, 1962) and those of their neighbours that the new occupants would agree to continue feeding the Badgers that came regularly to their french windows. Harting (1888) noted that Badgers did not "seem to mind the proximity of human habitations", but it is doubtful whether he could have imagined a situation like this! When a few of us visited the Weybridge site in May 1962 we found a well-marked Badger path running across a succession of narrow garden-plots and passing under the newly-erected dividing fences. We noted seven entrances of an old set distributed over three adjacent gardens. The site was devoid of any cover and had evidently been deserted, but there was, fortunately, a larger set in an older garden with a dense Rhododendron shrubbery further down the road. This was still occupied and was evidently the source of the Watsons' visitors.

Sets are often completely destroyed by housing development, and quite a few of those in Surrey, which were active when the Survey began, have been obliterated since. Sets can also become surrounded by houses. This happened at Harlow, Essex (W. W. Page, *in litt.*). The Badgers were often seen in the surrounding gardens and in the roads, and when disturbed near the set they would lie low in the Bramble and keep still until danger had apparently passed. As Mr. Page points out, the normal reaction is a swift retreat, usually into the set.

In rural areas it is surprising how much physical disturbance and human activity Badgers will sometimes tolerate in the vicinity of the set. They continued to occupy one on Esher Common even after the ground around it had been cleared of trees and other vegetation and an electricity pylon had been erected. In 1961, at a large Kentish set, we found that the animals had not been unduly disturbed by chestnut coppicing operations which had completely transformed their immediate surroundings. Sand thrown out of the entrances showed they were still in residence, and heaps of it covered the recumbent chestnut poles.

Many of London's Badgers must have become accustomed to a great deal of noise. None can now escape the sound of jet aircraft passing overhead, and a good many are living within yards of a busy road or railway line. Sankey (1955) found the Badgers on Box Hill, Surrey, in-

different to the sound of voices from various buildings, including loud-speaker announcements at a near-by railway station. Despite such background noises, the animals at one set emerged earlier than they did elsewhere, and in summer were sometimes seen well before dark.

Whall (1963) even found that he could take his radio with him when watching Badgers in Leicestershire, but perhaps the choice of programme is important. An amusing Hargreaves cartoon on the subject suggests that there are limits to a Badger's powers of endurance!

DISCUSSION

The contributions to the *Victoria County History* volumes on the subject of Badgers in the Home Counties make curious reading in the 1960s.

In Kent, Baker (1908) described the Badger as "rare", probably "visiting most of the wooded districts at intervals". In Surrey, Bucknill and Murray (1902) stated that it was "confined to the most rural districts" and that "they were once quite abundant round Boxhill". In Essex and Hertfordshire its position was apparently little better. Laver (1903) considered it "by no means extinct" in Essex and thought it worth mentioning that E. N. Buxton had liberated Badgers in Epping Forest in 1886, where "in all probability they were not extinct . . . even before these were introduced". In Hertfordshire, according to Crossman (1902) the Badger was not considered as plentiful as it had been, but was "still far from being extinct".

The accounts suggest that the Badger was far from common around London at the beginning of the century—unless the authors were very indifferent mammalogists! Contemporary writers elsewhere, however, made similar observations, and it seems that the Badger was generally considered to be something of a rarity. That its numbers have greatly increased since there is no doubt (Southern, 1964).

Man has been, and still is, the Badger's principal enemy, and one can assume that some change in human behaviour has helped it to prosper in the twentieth century. Mention has already been made of the way the mass-media may have helped to foster a better understanding of the animal. The Badger, which was once universally persecuted, has gained some respect. Its pied mask has been adopted as the motif on the tie worn by supporters of the County Trusts for Nature Conservation, and it would be hard to think of any British mammal that is more popular in educated circles.

But this slight amelioration of the climate of public opinion is a very recent development. The Badger's change of fortune came before this, and is almost certainly related to the decline in game-keeping in Britain, which dates from the beginning of World War I. The Carrion Crow *Corvus corone*, Magpie *Pica pica* and Jay have also increased in numbers over the same period as a result of less persecution (Parslow, 1967), while the decline in the population of the Buzzard *Buteo buteo* between 1800 and 1915 and its increase between 1915 and 1954 is also closely correlated with the history of game-preservation (Moore, 1957).

There has, of course, been a revival of interest in game-rearing since the last war, and inevitably there are strong feelings in some quarters concerning the presence of Badgers in the coverts. Drastic action is often taken, but one can feel reasonably confident that there will be no return to the intensive persecution of predators practised in the Victorian era.

The Badger now appears to be a fairly common mammal in many

of the rural parts of the Society's Area. Over much of its range its presence is tolerated; in a good many places it is encouraged and protected. But while it seems likely that there may be good numbers of Badgers in the Area for some years to come, there are certain factors to be considered which are not in the animals' favour.

In the first place, the growth of the built-up areas must certainly mean a loss of habitat. Even if an old set survives on a new housing estate the occupants are not likely to remain if, as is usually the case, the general, as well as the immediate environment is drastically altered. The average suburbanite, even if he likes the evicted Badgers to continue to visit his garden, is unlikely to want them to re-open an old set or establish a new one there, and practise their own spectacular brand of landscape gardening. The modestumps of the Mole *Talpa europaea* are considered bad enough. So unless the garden is exceptionally large and the owners are exceptionally tolerant, the Badgers have to go.

It has already been noted that certain very large gardens and the grounds of some establishments in older suburbs of London have retained their breeding Badgers. Populations like these apparently survive, not simply because the animals and their sets are left alone, but also because there is easy access to much larger areas of open space where they can find food, especially earthworms, an important item of Badger diet. This would account for the success of the Badgers in the Wimbledon/Richmond district, where large gardens cluster around the vast open space comprising Richmond Park, Wimbledon Common and a number of golf courses.

Another form of "development" which must also be having a harmful effect on the Badger is the proliferation of new roads. These may obliterate sets or split up feeding grounds habitually used by the animals. Fast traffic takes its toll, and Ruth Murray (1968), commenting on the many hazards now facing the Badger in the changing countryside, mentions that the number of motorway casualties that are brought to her increases year by year. Some road deaths are reported from the London Area each year, but no information is available on the effects the motorways have had on either wild life or habitat. A set on Esher Common is doomed by the proposed Esher By-pass (Hersey, 1967) and it is ironical that it should be the one that survived the erection of the power line.

Changes in farming methods constitute another threat. The wooded hedge-banks and "shaws" of Kent and Surrey are an important refuge for Badgers, providing the animals with a convenient sloping site for a set, good cover, and easy access to the fields, where much of their food, particularly earthworms, is obtained. The modern tendency is to enlarge fields by removing the hedges, a process which has already transformed much of the arable land of eastern England (Moore, 1962, and Moore *et al.*, 1967).

Moore (1962) also drew attention to the increased use of toxic chemicals on the land. It is known that animals at the end of food chains are harmed by the cumulative effects of organochlorine substances, and that reproduction can be seriously influenced. It is known that earthworms can carry sub-lethal amounts of chlorinated hydrocarbon residues (Cramp *et al.*, 1964), and this means that the Badger is liable to suffer. Observations from several parts of the country suggest that there has been a drop in litter size in recent years, and naturalists are being asked to check annually on the number of cubs seen at sets of their acquaintance. At the same time, Badgers found dead and in good condition are being examined

(in London) by Professor R. J. Harrison at the Department of Anatomy, London Hospital Medical School, Turner Street, E.1.

Fortunately for our Badgers the surroundings of London are less intensively farmed than are the counties to the north-east of the capital, and there is at present a wealth of semi-natural countryside in the Society's Area, downland, woodland and heath which has been preserved for its scenic and recreational value. Now, in the 1960s, much of this is Badger country. It is to be hoped that it and its Badgers will still be part of the countryside in the decades to come.

SUMMARY

1. A Survey of the distribution of the Badger *Meles meles* (L.) in the London Natural History Society's Area was started in 1959, and relevant material was collected until the end of 1964. The enquiry became a part of the National Badger Survey which was started by the Mammal Society in 1960.
2. Methods of detecting Badgers and their sets are described.
3. Data recorded included the location of each set visited, its size and topography, the altitude above sea level, the geology and vegetation.
4. 164 sets were examined, most of them in Kent and Surrey. Over a hundred others are known to have been in existence during the Survey period.
5. The Badger was found to be well distributed over much of rural Kent and Surrey, and appeared abundant in the Kentish section of the North Downs and in the Esher, Cobham and Weybridge districts of Surrey. It occurs on and near the Middlesex/Hertfordshire boundaries and in several wooded areas of south-east Hertfordshire and south-west Essex. Although there are sets well within the south-west suburbs of London, no proof could be obtained that Badgers were still living at Hampstead.
6. Most sets were found in sand, but a good number were found on the Chalk and in Clay-with-flints. There was a tendency for animals to avoid the London Clay, except where there were superficial deposits of sand or gravel.
7. Sets were found at altitudes of between 25 and 600 feet. Of those seen in Kent and Surrey nearly 50 per cent. (of a total of 150) were between 400 and 600 feet.
8. The great majority of sets were in broad-leaved woodland, especially oakwoods, but other sites were also used. There were usually trees or bushes in the neighbourhood of the set.
9. Most of the sets were on sloping ground, but sometimes only minor banks were used. The aspect of the slope did not seem to have much importance.
10. Many of the sets were situated at some distance from any permanent water supply.

11. Sets ranged in size from those with a single entrance to complex sites with over 40 entrances. The largest had 79; the majority had up to five entrances. Most of the larger sets were in sand.
12. Despite some improvement in public opinion the Badger is still persecuted, and recent cases have been recorded in the London Area.
13. Where Badgers are living in the London suburbs they often come to food put out for them. The spread of the suburbs, however, results in the destruction of sets.
14. In the rural parts of the Area Badgers often tolerate a good deal of noise and disturbance.
15. The Badger was uncommon around London and elsewhere at the beginning of the century, but has increased since, very possibly through the decline in game-keeping which started during the First World War. Although now a reasonably common animal in the London Area, with perhaps fewer human enemies, it faces new threats, (i) the destruction of habitat through housing development and the building of new roads, (ii) the increased danger from road traffic, and (iii) changes in agricultural practice, e.g. the removal of hedgerows and the use of persistent toxic chemicals.

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Further London Fish Records to 1968

By DAVID MARLBOROUGH

(*Recorder of Fishes*)

SINCE the last list of London fish records (Marlborough, 1965) a considerable number of further reports have been received by the Recorder. This present list covers those received in the four years to 1968.

I am pleased to note that appeals for more fish records in the previous two lists (Marlborough, 1962 and 1965) have borne fruit. Much of the present paper is derived from the responses to these appeals. Other records have come from two books.

One, the anonymous *London and Home Counties Angling Guide* (no date) was probably extant when the two previous record lists were drawn up, but it was only discovered more recently. I have my own personal reservations on data drawn from it: well-known waters near Cheshunt (Herts.) are placed in Surrey, for example. However, it has added some new records, and corroborated or duplicated many more.

The other (Whitehead, 1967) has been published since the last paper, and has produced many records.

There is one serious defect in the present paper: the paucity of records from Kent, and to a lesser extent, from Surrey. North of the Thames is amply covered. I hope this imbalance will be made good by the time the next paper is published.

The manner of compilation and presentation is the same as in the previous reports. Care has been taken to avoid duplication with them and with Wheeler 1958. Some errors may have crept in however, in regard to synonyms for water names. They have probably arisen in the case of Ruislip (Middx.) through duplication. Another probable example is "Upper Lake, South Weald" (Essex) which may be synonymous with "Weald Park Lake" in previous papers. In these and other cases, it was felt better to include them, in case they were not synonymous, rather than to leave them out.

Two slight divergences from previous practice should be noted. One is that some records on the very fringe of the L.N.H.S. area, or over the boundary, are included. The other is that actual locations along a continuous length of canal or river are now noted, rather than such formulae as "common throughout length" or "between x and y".

This second change is to provide locations for constructing species maps based upon the "tetrad" system. Such maps have in fact been drawn up by the Recorder, using records in this, the previous two papers, and the later records of Wheeler, 1958. Space forbids their inclusion at present, but it is hoped to show them with commentary in future.

The sources for this paper are indicated as before by abbreviations. I wish to extend my thanks to all those who have contributed to this paper. They are listed here with their abbreviations: B. P. Pickess (BPP); J. Wade (JW); B. S. Meadows (BSM); personal observations (DM); G. H. Gush (CHG); P. S. Croft (PSC); C. P. Castell (CPC); J. Cooper (JC); P. A. Moxey (PAM); B. L. Sage (BLS); Keith Perry (KP); Mrs. A. Warren (AW); M. Parks (MP); *London and Home Counties Angling Guide* (LHG); Whitehead, 1967 (KEW).

Cases of especial interest and comments will be given in the species list, but one general observation should be made before. This is, the

marked improvement in the Thames in the last few years. In 1960 the general consensus was that fishing ceased to any worthwhile extent below Richmond, and fish were only sporadically found further downstream. From the specimens listed below as taken on the intake grids of power stations (e.g. Fulham), it can be seen that this is no longer true. I have reliable but only verbal assurance that fish come to the hook in worthwhile numbers as far down as Chelsea, and occasional fish have been seen right down to Westminster. Let us hope this trend continues.

SPECIES LIST

LAMPERN. Non-migratory form *Lampetra planeri* (Bloch.)

This species may be more common in *clean* running waters on the edges of the area than the few records here would indicate. Most of its life-cycle is spent hidden as larva, and it will normally only be seen when the adult emerges in the spring to spawn and die.

THAMES and LEE. R. Lee, Hertford New Gauge, October 1964 (BSM).

HERTS. R. Chess near Sarratt, spring 1965 (DM).

SALMON. *Salmo salar* L.

Whether this migratory fish will ever return permanently to the Thames in the lifetime of any of us is debatable. There is however a report of salmon "from the filter screens of Fulham Power Station" (*Daily Telegraph* 21.9.66, p16).

BROWN TROUT. *Salmo trutta* L.

THAMES and LEE. More captures have been reported from past localities: new ones are Walton (LHG); Weybridge (CHG) on the Thames. On the Lee Navigation we may note Hertford Lock (BSM and KEW); and Stanstead Lock (KEW).

SURREY. Mixnam's Lane gravel pits, near Penton Hook—a stocked water (DM).

MIDDX. and BUCKS. Ashmere Lake near Shepperton—a stocked water (LHG); R. Colne, Uxbridge Moor—a few (LHG).

HERTS. Quite common on the fringes of the area, e.g. R. Mimram near Hatfield (DM and LHG); R. Beane near Hertford (KEW, LHG) and R. Rib near "Westmill" (LHG). This last is certainly a misprint for Wadesmill (KEW, DM). Other localities are R. Ash 13.9.65 (BSM); R. Chess near Sarratt (DM); R. Ver near Frogmore (KEW)—though I know this water and have found none (DM); R. Colne in the Watford-Rickmansworth area—a very few (JW).

ESSEX. R. Roding at Curtis Mill Green (KEW).

RAINBOW TROUT. *Salmo irideus* (*S. gairdnerii*) Gibbons.

HERTS. The R. Chess rainbow trout (Marlborough, 1965) have been demonstrated to penetrate downstream into the L.N.H.S. area (DM, LHG).

GRAYLING. *Thymallus thymallus* (L.)

HERTS. Occasional penetration into the area on the R. Chess in the Sarratt-Rickmansworth area by specimens dropping downstream (JW) corroborating Marlborough (1965).

PIKE. *Esox lucius* (L.)

THAMES and LEE. R. Thames, Hampton Court (PSC); Datchett and Windsor (LHG). These are merely new points on a continuous distribution. Likewise, in the Lee at King's Weir, Broxbourne, Waltham Abbey (AW); Hertford Lock, Ware Mill Stream, Carthagena Lock, Cheshunt, Rammey Lock (KEW); also Tottenham Lock on Lee Navigation (BSM), where Wheeler, 1958 has "no recent records below Ponders End".

SURREY. Ham Gravel Pits (GHG); Mixnam's Lane gravel pit near Penton Hook (DM); Warren Pond, Weybridge, and Thorpe gravel pit Chertsey (GHG).

MIDDX. and BUCKS. R. Misbourne, Denham Village (BPP); Ruislip Local Nature Reserve (PAM, BPP); Mayfield Lake, West Drayton (LHG).

HERTS. Gravel pit near Broxbourne (AW); New River, Palmers Green (GHG); Hilfield Reservoir, Elstree (BLS); R. Colne below Springwell Lake, Rickmansworth (BPP); Smallford Gravel Pits near Hatfield (DM); Trent Park Lake, Cockfosters 15.2.67 (BSM); R. Beane, Hertford (DM); gravel pits near Watford (JW); Grand Union Canal, Batchworth Lock and confluence with R. Chess; L.A.A. gravel pits Frogmore, near Radlett; Toyhall Pit, Cheshunt; Twickenham Pits, Waltham Cross (KEW).

ESSEX. Banbury Reservoir, Walthamstow (DM); Epping Forest Ponds; Hollow Ponds, Whipps Cross; R. Roding, Curtis Mill Green; Upper Lake, South Weald; Hainault Forest Lake (KEW).

COMMON CARP. *Cyprinus carpio* (L.)

Still being widely introduced into still waters; occasional specimens turning up also in canalised rivers.

THAMES and LEE. R. Thames, Walton and Hampton Court (LHG)—Wheeler (1958) has a past record at Hampton in 1749; R. Lee, Brimsdown Power Station outfall (KEW).

KENT. Sevenoaks pits near Longford (LHG).

SURREY. Ewell Court (PSC); Barnes Common pond, until 1962 (KP); Wimbledon Park pond (LHG)—Wheeler's nearest record to this is 1910.

MIDDX. and BUCKS. Mayfield Pit, West Drayton (LHG).

HERTS. Lakes near Watford (DM and JW); R. Colne near Watford—escapes from connected lakes (JW); L.A.A. pits, Frogmore, near Radlett; gravel pits at Smallford, near Hatfield (DM); Grand Union Canal at Grove Mill; Northmet Pit, Cheshunt (KEW).

ESSEX. Connaught Water, Chingford; Upper Lake, South Weald; Eagle Pond, Snaresbrook; The Chase, Dagenham (KEW).

CRUCIAN CARP. *Carassius carassius* (L.)

MIDDX. and BUCKS. Moor Lane Fishery, Wraysbury (GHG); Wall Pond, Hampton Court (*Angler's Mail* 6.8.66); Spring Ponds, Stanmore Common—established after death of previous fauna by pollution (DM).

SURREY. Ashtead Park (PSC).

HERTS. Smallford gravel pits near Hatfield (DM); Trent Park, Cockfosters 15.2.67 (BSM); L.A.A. pits, Frogmore, near Radlett (KEW).

ESSEX. Hainault Forest lake (KEW).

GOLDFISH. *Carassius auratus* (L.)

These popular pets are probably frequently turned down in the L.N.H.S. area. Those that survive revert quickly to the "wild" colora-

tion in a few generations. I would be interested in any records *not* from ornamental ponds.

SURREY. Isle of Wight Pond, Bookham Common, 17.7.66 and 1.9.67 (JC). All three specimens were of "wild" coloration.

"PRUSSIAN" CARP. *Carassius sp.* var. *gibelio*.

Authorities seem to differ on the exact status of this slim variety of the genus *Carassius*. Being a variety of either *C. carassius* or *C. auratus*, it would be expected to occur with populations of either. Reports of "Prussian" carp often turn out to be ordinary crucians; but there is one record of a capture at Manor Ponds, Brentwood, Middx. reported in *Angling Times* 1.4.66 (GHG).

CRUCIAN × GOLDFISH HYBRID.

This hybrid may occur in the wild; there is a record of an accidental cross-breeding in an ornamental pond in Stoke Newington after introduction of both parent species (DM).

BARBEL *Barbus barbus* (L.)

Still an exclusively riverine species, it appears to be extending its habitat, especially on the Lee.

THAMES and LEE. R. Thames, Walton and Hampton Court (PSC); Windsor and Dorney (LHG); R. Lee—Feildes Weir; Carthagena Lock; King's Weir; Stanstead Abbotts (KEW, BSM); Brimsdown Power Station outfall (KEW); Hertford Lock (KEW); sidestream near Kings Weir (*Angling Times* 8.8.68); Rammey Marsh Weir (KEW). Between Rammey Marsh and the Girling Reservoir intake, 300 barbel counted by BSM on 27-12-64. Compare with Wheeler (1958), "not apparently found today below Waltham Abbey".

There are also persistent rumours that barbel are found in the reservoirs drawing water from the Lee (King George V, Banbury, William Girling, etc.). As other riverine species such as chub (see below) and dace (Marlborough, 1965) will live well in certain still waters, this is not at all unlikely.

HERTS. Rivers Beane and Rib at Hertford 15.2.67 (BSM).

GUDGEON. *Gobio gobio* (L.)

THAMES and LEE. R. Thames, Walton (PSC). R. Lee—abundant and may be extending its range: abundant in Lee Diversion, Chingford, and in conduits by Banbury Reservoir near Walthamstow (DM). In the main R. Lee at Stonebridge Lock (KEW) and Kings Weir (AW).

SURREY. Ewell Court (PSC).

MIDDX. and BUCKS. Grand Union Canal, Ladbroke Grove; Serpentine, Hyde Park (KP).

HERTS. R. Colne below Stocker's Lake and Springwell Lake, Rickmansworth (BPP); Trent Park lake, Cockfosters 15.2.67 (BSM); R. Gade, Cassiobury Park, Watford (JW); New River, Hoddesdon (MP).

ESSEX. Eagle Pond, Snarebrook (KEW).

TENCH. *Tinca tinca* (L.)

THAMES and LEE. R. Thames, Hampton Court (PSC); R. Lee—many places: Hardmead Lock, Stanstead Lock; Kings Weir, Broxbourne, Waltham Abbey, Brimsdown Power Station (KEW, AW); Rye House (LHG); and confluence with R. Stort at Feildes Weir (KEW).

SURREY. Ham Pits (LHG); Wimbledon Park Lakes (LHG)—Wheeler's record is 1912.

MIDDX. and BUCKS. Moor Lane Fishery, Wraysbury (GHG); Mayfield Lake, West Drayton (LHG); Shepperton pits (*Angler's Mail*, 6.8.66).

HERTS. Grand Union Canal, Cassiobury Park, Watford; Toyhall Pit, Cheshunt; Twickenham Pit, Waltham Cross (KEW); Frogmore Pits, Radlett (KEW, DM); Smallford Pits near Hatfield (DM); Trent Park Lake 15.2.67 (BSM).

ESSEX. Epping Forest ponds; Hollow Pond, Whips Cross; Upper Lake, South Weald; Eagle Pond, Snaresbrook; Berwick Ponds, Rainham; Dagenham Chase (KEW).

MINNOW. *Phoxinus phoxinus* (L.)

Another poorly-recorded small fish, though we are slowly accumulating more records.

THAMES and LEE. R. Lee—Hertford Basin, Feildes Lock, Pickett's Lock (KEW); City Mill River (BSM). There may be confusion with Bleak on parts of the Lee, especially the KEW records.

SURREY. Isle of Wight Ditch, Bookham Common (CPC); Ashtead Park, and stream in Ashtead village (PSC); R. Wey at Weybridge (GHG).

HERTS. R. Gade, Cassiobury Park, Watford (BPP); stream near Hill End, Rickmansworth (BPP); R. Chess near Sarratt (DM).

CHUB. *Squalius cephalus* (L.)

THAMES and LEE. Well-known in the Thames; new specific places are Datchet Weir (DM); Bell Weir, Runnymede, and backwaters near Weybridge (LHG). In the Lee, specific places are Hertford Lock, Feildes Lock, Dobbs Weir and Pickett's Lock (KEW and LHG); Ware Mill Stream (LHG); Lady Dock (below Stonebridge Lock) a $3\frac{1}{2}$ lb. specimen in 1964 (KEW); Lee Diversion, Chingford (DM). Chub are also noted from the Small River Lee between Wormley and Rammeay Lock; a tributary at Sun Street (KEW); and from Rye Meads sewage works channel (BSM).

SURREY. R. Bourne at Thorpe (GHG).

MIDDX. and BUCKS. Bushey Park (PSC).

HERTS. R. Gade at Cassiobury Park (KEW)—only a few; *reported* from R. Colne in Watford and Rickmansworth area (DM); Smallford gravel pits near Hatfield—probably introduced by an angler into this isolated pit. It was found at a meeting and weighed approximately $3\frac{1}{2}$ lbs.

ESSEX. Nazeing Brook (BSM); R. Roding, Curtis Mill Green (KEW).

DACE. *Leuciscus leuciscus* (L.)

Many of these records are specific places along rivers in which this fish is widely distributed.

THAMES and LEE. R. Thames, Walton (PSC); many places along the Lee; Hertford Basin and Lock (KEW, LHG); Ware Mill Stream, Hardmead Lock, Stanstead Lock, Feildes Lock, Dobbs Weir, Cheshunt, Rammeay Lock, Pickett's Lock, Brimsdown Power Station (KEW); Lee Diversion, Chingford (DM); Lee Navigation, Hertford New Guage to Ware Lock, Amwell Magna (BSM); Small River Lee, Wormley to Rammeay Lock (KEW); Stort Navigation, confluence with Lee at Feildes Weir (KEW). In the Thames, specific places are: Molesey, Canbury, Windsor and Dorney (LHG).

SURREY. R. Mole, Mickleham (GHG).

MIDDX. and BUCKS. Bushey Park (PSC).

HERTS. Streams at Monken Mead and Hadley Wood, near Barnet; Cobbins Brook (BSM); R. Ver at Frogmore (KEW), and patchily from there upstream to St. Albans (DM); R. Gade, Cassiobury Park, Watford (KEW); R. Colne, London Colney (KEW, DM).

ESSEX. Nazeing Brook (BSM); R. Roding at Loughton Bridge and Curtis Mill Green (KEW).

ORFE. *Idus (Leuciscus) idus* (L.)

This is a tolerably common introduction to ornamental ponds, eg. St. James's Park. It is widespread on the Continent, and stands our climate well; it is well-established in certain lakes outside the area. Below, however, is the first non-ornamental record I have received, and I would like more if there are any.

HERTS. Hilfield Reservoir, Elstree (BLS, 1.8.66).

ROACH. *Rutilus rutilus* (L.)

Still perhaps the best-known and most abundant fish in the London Area: the Perch is the only possible rival amongst angler's fishes. With the Perch, one of the earliest colonisers of new waters such as gravel pits.

THAMES and LEE. From the intakes of Fulham Power Station, 20 to 30 lbs. of fish taken per tide (*Daily Telegraph*, 21.9.66 p.16); from the intakes of Bankside Power Station (*Daily Express*, 5.11.66); other specific places on the Thames are Petersham, Molesey, Canbury, Bell Weir, Runnymede and Egham (LHG); Chertsey (LHG); Walton and Hampton Court (PSC).

From the Lee, recorded far upstream at Hatfield and Lemsford (DM); Hertford Basin and Lock, Ware Mill Stream (KEW, LHG); specific places are Hardmead Lock, Stanstead Lock, Feildes Weir, Dobbs Weir, Carthagen Lock, Cheshunt Lock, Rammey Lock, Brimsdown Power Station, Cook's Ferry Bridge under North Circular Road (KEW); Stonebridge Lock (KEW); Kings Weir and Broxbourne (AW). In the tributaries and side-streams, the Stort Navigation at Feildes Weir (KEW); Small River Lee, Wormley to Rammey Lock (KEW); stream in Waltham Abbey grounds (KEW); Lee Diversion, Chingford (DM).

SURREY. New Lines Pond, Addlestone (GHG); R. Mole, Mickleham (GHG); Ashtead Park and Ewell Court (PSC).

MIDDX. and BUCKS. Ruislip Local Nature Reserve (PAM, BPP); Moor Lane Fishery, Wraysbury (GHG); Grand Union Canal, near Kensal Rise Gasworks (KP); Regent's Canal, Victoria Park (BSM); Mayfield Lake, West Drayton (LHG).

HERTS. Hilfield Reservoir, Elstree (BLS); R. Misbourne, Denham village; R. Colne below Stockers Lane and Springwell Lake; R. Gade at Cassiobury Park, Watford (BPP); Trent Park Lake, Cockfosters 15.2.67 (BSM); Grand Union Canal at Watford Lodge, Cassiobury Park, Common Moor and Batchworth Lock (KEW); R. Beane, Hertford (KEW); R. Ver below Frogmore and Radlett (KEW, DM); R. Chess at Batchworth Lock (KEW); R. Gade at Colney Butts—much deteriorated (KEW); R. Colne near Watford—a few (JW); lake near Colne in Watford area (JW); Twickenham Pits, Waltham Cross (KEW); new pits at Smallford near Hatfield (DM).

ESSEX. Banbury Reservoir, Walthamstow (DM); Hollow Ponds, Whipps Cross; Upper Lake, South Weald; Eagle Pond, Snaresbrook;

The Chase, Dagenham; R. Roding, Curtis Mill Green (KEW).

RUDD. *Scardinius erythrophthalmus* (L.)

THAMES and LEE. In the Lee, at Feildes Weir and Dobbs Weir; in the outfall of Rye Meads Sewage Works (BSM).

SURREY. Isle of Wight Pond, Bookham Common (CPC, JC); Ashtead Park (PSC).

MIDDX. and BUCKS. Bushey Park (PSC); Ruislip Local Nature Reserve (BPP); Mayfield Lake, West Drayton (LHG).

ESSEX. The Chase, Dagenham (KEW).

BRONZE BREAM. *Abramis brama* (L.)

THAMES and LEE. R. Thames, Walton and Hampton Court (PSC); also Bell Weir and Runnymede (LHG). Of greater interest is from the intake of Fulham Power Station (*Daily Telegraph* 21.9.66, p.16). From the Lee, specific places are: Hertford Basin, Ware Mill Stream, Stanstead Lock, Feildes Weir, Dobbs Weir, Carthagena Lock, Brimsdown Power Station, Stonebridge Lock (KEW); also at Amwell on the Lee Navigation (DM); and the Stort Navigation near Feildes Weir and the Lee confluence (KEW).

SURREY. Locally *reported* from Thorpe gravel pit (GHG).

MIDDX. and BUCKS. Ruislip Local Nature Reserve (BPP); Grand Union Canal near Kensal Rise Gasworks (KP); Thorney Weir pits near West Drayton (DM); Staines South Reservoir (DM).

HERTS: R. Colne below Springwell Lake (BPP); Stockers West Lake near Rickmansworth (DM); gravel pits near Broxbourne (*Angler's Mail*, 6.8.66); Twickenham Pit, Waltham Cross; Northmet Pit, Cheshunt; Frogmore Pits near Radlett (KEW); Grand Union Canal at Hunton Bridge, Cassiobury Park, Batchworth Lock, and the Gade/Colne confluence (KEW); lake near Watford (JW).

ESSEX. Banbury Reservoir, Walthamstow (DM); Highams Park, Hale End; The Chase, Dagenham (KEW).

BLEAK. *Alburnus alburnus* (L.)

A common riverine fish still under-recorded because of its small size, though easily seen because of its love of the water surface.

THAMES and LEE. Specific localities on the Thames are Walton (PSC); Windsor and Datchett (DM). In the Lee, specific localities are Kings Weir and Broxbourne (AW); Pickett's Lock (KEW); Feildes Weir (collected BSM, verified DM). Also the Lee Diversion, Chingford (DM).

SURREY. St. Anne's Gravel Pit, Thorpe—entered from nearby R. Bourne (GHG).

STONE LOACH. *Nemacheilus barbatula* (L.)

Still poorly recorded, but may be much more common in outer-area streams than generally realised.

SURREY. Ashtead village stream (PSC).

MIDDX. and BUCKS. R. Misbourne, Denham village (BPP).

HERTS. R. Colne below Stockers Lake, and stream near Hill End, both near Rickmansworth (BPP); R. Gade at Cassiobury Park, Watford (BPP); Honey Lane Brook 27.7.65 (BSM).

SPINED LOACH. *Cobitis taenia* (L.)

To my knowledge this has not been recorded before from the area. Very little is known about its distribution or biology in the country as a whole, but it seems to be much rarer (or more secretive) than the Stone Loach. The two species inhabit the same sort of water, and may be found together. Observations on the Upper Ouse indicate that the Stone Loach, as its name suggests, lives under stones; whereas the Spined Loach is to be found in dense beds of algae on the stream bottom. Further records would be appreciated, together with some description of where found.

The specimen came from the Small River Lee near Cheshunt, taken by BSM in May 1966 and communicated to me 18.2.67.

EEL. *Anguilla anguilla* (L.)

THAMES and LEE. From the intake screens of Fulham Power Station (*Daily Telegraph*, 21.9.66 p.16); two big Eels from the Thames are a 5 lb. 15 ozs. specimen from Petersham (GHG), and a 6½ lb. Eel from Walton (GHG). The latter specimen was 46 inches long.

In the Lee, records are from: Lee Navigation, Brimsdown; R. Lee, Lee Valley Rd., Chingford; Stanstead Abbotts (BSM); also Feildes Weir, Hardmead Lock, Dobbs Weir, and Stonebridge Lock (KEW).

SURREY. A large specimen 51 inches long was found dead by Dr. Haler on the R. Wey at Weybridge 20.6.68 (GHG).

MIDDX. and BUCKS. Eel seen in sewer under Askew Road, Kensington (*Observer Review*, 22.8.65). This may well be a regular migration route through the conurbation: Eels have been seen in sewers in King's Lynn (Norfolk) and other places too.

HERTS. A very few taken from lakes near Colne at Watford (JW); one reportedly found dead on path by Aquadrome Lake, Rickmansworth (DM); Twickenham Pits, Waltham Cross (KEW); Salmons Brook 3.4.64 (BSM).

ESSEX. Hollow Ponds, Whipps Cross (KEW).

PERCH. *Perca fluviatilis* (L.)

One of the most abundant and widespread species in the area; records still come in quantity.

THAMES and LEE. Specific Thames localities are: Walton (PSC); Datchett and Windsor (DM); Petersham, Molesey, Canbury and Chertsey (LHG). Specific Lee localities are: Hertford Basin, Hardmead Lock (LHG, KEW); Stanstead Lock, Feildes Lock, Carthagena Lock, Kings Weir, Rammey Lock, Enfield Lock, Picketts Lock, Stonebridge Lock (KEW); Stort Navigation at Feildes Weir (KEW); Lee Navigation, Springwell Park, from filter beds of Walthamstow Reservoirs (BSM).

SURREY. Crystal Palace, Lower Lake 27.8.67 (JC); Mixnam's Lane gravel pit, near Penton Hook (DM); Warren Pond, Thorpe Gravel Pit (GHG); Ham Pits (LHG).

MIDDX. and BUCKS. Alexandra Park (KEW), Ruislip Local Nature Reserve (BPP); Regent's Canal, Victoria Park (BSM); Mayfield Lake, West Drayton (LHG).

HERTS. Hilfield Reservoir, near Elstree (BLS); R. Colne near Springwell Lake (BPP); Grand Union Canal at Watford Lodge, Cassiobury Park, West Watford, and Watford Lock (KEW); R. Chess at confluence with Grand Union Canal, Batchworth; R. Gade at Cassiobury Park; R. Colne at London Colney (KEW); Frogmore Pits near Radlett (KEW, DM); Toyhall

Pit, Cheshunt; Twickenham Pits, Waltham Cross (KEW); Trent Park Lake, Cockfosters (BSM).

ESSEX. Banbury Reservoir, near Walthamstow (DM); Epping Forest ponds; Hollow Pond, Whips Cross; Upper Lake, South Weald; Wanstead Flats; Eagle Pond, Snaresbrook; The Chase, Dagenham; Hainault Forest Lake; R. Roding, Curtis Mill Green (KEW).

RUFFE. *Acerina cernua* (L.)

Another small, and therefore poorly recorded, species. Any records away from the Thames and Lee should be noted.

THAMES and LEE. R. Thames, Datchett and Windsor (DM).

MIDDX. and BUCKS. Staines South Reservoir (DM) in considerable shoals.

HERTS. Trent Park Lake, Cockfosters 15.2.67 (BSM).

BULLHEAD. *Cottus gobio* (L.)

Another small and poorly-recorded fish, though probably more abundant in clean streams than generally realised. Not so secretive as the Loaches, it is active and visible in daylight, though usually well camouflaged against the bottom.

HERTS. R. Colne below Stockers Lake (BPP); R. Chess near Sarratt (DM); Trinity Lane Brook, Cheshunt 1964/5 (BSM).

THAMES and LEE. R. Lee, Cheshunt (BSM).

THREE-SPINED STICKLEBACK. *Gasterosteus aculeatus* (L.)

The most common small fish, and probably the most ubiquitous of all fishes in the London Area. It is one of the few species observers are likely to find in almost any water in *central* London, and which has got there naturally.

THAMES and LEE. Lee Navigation—Old Ford Lock (BSM); R. Lee near Hackney Power Station (BSM).

SURREY. Upper Eastern Pond 1944-1946, and Central Ditch 1955, Bookham Common (CPC); Isle of Wight Pond 1.9.67, Bookham Common (JC); streams on Bookham Common (GHG); Ashtead Park and stream in Ashtead village (PSC); R. Bourne, Chertsey; drainage brooks on Wey Manor Farm, Addlestone (GHG).

MIDDX. and BUCKS. R. Misbourne, Denham village (BPP); Grand Union Canal, Ladbroke Grove, Kensal Rise (KP); Silk Stream in Edgware and Burnt Oak (DM).

HERTS. R. Colne below Stockers Lake (BPP); and in central Watford (DM); R. Gade, Cassiobury Park, Watford (BPP); stream at Hill End, near Rickmansworth (BPP); R. Colne below Springwell Lake (BPP); R. Ver at Frogmore near Radlett (DM)—and probably in the adjoining gravel pits, as this river has flooded over into them in the past.

TEN-SPINED STICKLEBACK. *Pygosteus pungitius* (L.)

Rarely identified critically. More information on its distribution and habitat is needed.

HERTS. Tributary of Colne near Uxbridge (BPP and DM).

ESSEX. R. Stort, caught by D. Marpole (BSM).

HADDOCK. *Gadus aeglefinus* (L.)

Fitter (1945) listed this marine fish as once occurring in the London

Area. In the words of Wheeler (1958) "it seems unlikely . . . [to] . . . have naturally occurred in post-glacial times in the London Area". However, one was taken on the intake screens of the power station at Northfleet Kent, and reported in the *Daily Mail*, 21.12.65.

GUPPY. *Lebistes reticulatus* (Peters)

After the foregoing list, this record is almost light relief. This small, prolific, livebearing fish is kept in "tropical" tanks by many people for the vivid colouration of the males. They will easily overbreed in captivity, and are hardier than most exotic fishes, so it is not surprising to hear of a colony in residence in a warm-water power station outfall at Hackney on the Lee (BSM). Doubtless they come from a jettisoned aquarium. They are apparently breeding and maintaining themselves.

Other similar colonies are known, outside the area: the most publicised one being on the St. Helens Canal in Lancashire. Here again they are in a warm-water outfall, the stretch being known locally as "the Hotties".

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Hemiptera-Heteroptera of the London Area

PART VI

By ERIC W. GROVES, F.R.E.S.

SOURCES OF RECORDS

The following are new sources of records:—

(a) Published and Manuscript:

63. Personal records of P. J. Chandler (from W. Kent).

(b) Museum and Society Collections:

C = British Heteroptera in the Dept. of Zoology, The University, Cambridge (containing the E. J. Newbery collection, etc.).

INDEX TO RECORDERS' NAMES

The following are in addition to those already listed in Parts I-V:—

P. J. Chandler	(PJC)	L. Christie	(LC)
J. Christie	(JC)	H. G. Denvil	(HGD)

MIRIDAE (Capsid bugs)

Subfamily: PHYLINAE (Contd.)

<i>Atractotomus mali</i> (Mey.-Dür)		Sp. 275 p. 228
D&S p. 435 (<i>A. magnicornis</i>)		S p. 309
B p. 528 (Sp. 413)		

Locally common. Occurs on apple and hawthorn where the species is predaceous on aphids and other small insects. The adults are present from June until early August.

MIDDX. St. John's Wood, *JAP* (BM); (Finchley Road, N.W.8), 27.vi.50, 16.vii.52 and 19.vii.61, all on hawthorn, *DL* (HD) (54); Hampstead Heath (West Heath), 22.vi.50, on hawthorn, *DL* (SC); Finchley, 14.vi.43, on *Prunus*, *CHA* (17); Hendon, 11.vii.1896, *EAN* (C); Edgware (Scratch Wood), 17.vii.57, *DL* (54); 18.vii.60 ♀♂ only, on apple, and 23.vii.60, on hawthorn, *DL* (HD) (54); Ruislip LNR, 24.vii.56, a single adult covered with pollen on bramble flower, *EWG* (49); Hanwell, 24.vi.-1896, from hedges, *EAN* (C); Hounslow Heath, 14.vii.53, locally very abundant on *Crataegus* on the Heath, *GEW* (40) (33c).

HERTS. Barnet, viii.1885, *EAB* (BM) (37); Boreham Wood, 27.vi.60, on hawthorn, *DL* (54); Radlett, 28.vi.60, on hawthorn, adults only in company with larvae of *Heterotoma merioptera* in abundance, *DL* (54); and beyond the boundary at Harpenden (Rothamsted Expt. Station grounds), 17.vi.34, to light, *DCT* (12); and Little Gaddesden, 19.vii.36, on *Crataegus*, *DCT* (12).

ESSEX. Epping Forest (Chingford), vii.07, 15.vii.11 and 15.vi.12 (IV instar larva), *EAB* (BM); (High Beach), vii.11, on hawthorn, *CN* (35a); (Theydon Bois), vii.22, *EAB* (BM), vii.22, *CN* (35a).

KENT. Blackheath, 12.vii.1896, *AJC* (HD); common, *AAA* (22) (51); Lewisham, 30.vi.1892, 8.viii.1892, 30.ix.1892, *AJC* (HD); Lewisham, 3.vii.1897, on whitethorn, *WW* (60) (39) (22) (1/1897(2), 138); Catford, 3.vii.1897, *WW* (60) (39) (4) (22); Lewisham (Southend), 17.vii.1897, on banks of the Ravensbourne, *WW* (60); Abbey Wood, vii, *AAA* (51); Swanscombe, viii, *AAA* (22) (51); Bromley, vii.1886, *ES* (HD); and Westerham, *AAA* (51).

SURREY. Kew Gardens, a single ♀, *JAP* (28) (3); Wimbledon Common, viii.1879, *ES* (HD) (3); Riddlesdown, 20.vi.53, adults, *EWG* (24);

AAA (51); Ashtead, 10.vii.48, *FJC* (SL) (62); Princes Coverts, 21.vi.48, *FJC* (SL) (62); Headley Lane, 1893, by sweeping *WW* (60) (62); Mickleham, *WJA* (SL); Boxhill, 9.vi.17, III instar larva, *EAB* (BM); *FJC* (62); Bookham Common, *WW* (62); 15.vii.49, *FJC* (SL); 14.vii.58, ♂, ♀ and V instar larvae; 16.vi.57, V and IV instar larvae, *EWG* (21); vii, *DL* (34); Surbiton, *ES* (3); on the boundary at Byfleet, *FJC* (62); Egham, 30.vi.54, *GEW* (40); and beyond at Chobham, *ES* (3); Guildford, 28.vi.43, 5.vii.43, and 14.vii.41, *ECB* (NM).

BUCKS. Langley Park 16.vi.55, *GEW* (EMM 92, 48); on the boundary at Ditton Park, 1.vii.55, *GEW* (EMM 92, 48); Hedgerley Park, 2.vii.55, *GEW* (EMM 92, 48) all three species by beating well-developed fruiting hawthorn growing in rough uncut pasture; Slough (PILG), 3.vii.53, *GEW* (40); and beyond at Burnham Beeches, 19.vii.54, beaten with *Deraeocoris olivaceus* from well-grown, fruiting hawthorns in well-developed oak/hawthorn scrub along eastern fringe of Burnham Golf Course, *GEW* (EMM 90, 237); and Amersham, 6.vii.52, on hawthorn and on hazel, *WJLeQ* (21).

Atractotomus magnicornis (Fall.) Sp. 276 p. 228
S p. 310 B p. 528 (Sp. 414)

Locally common. Found on spruce (*Picea* spp.) and occasionally on other conifers on which the adults may be found from end of June to early September.

MIDDX. Hampstead, 8.viii.43, *CHA* (17).

HERTS. Barnet, viii.1885, *EAB* (BM); Whetstone, vii and viii.61, ♂♂'s only, taken on various dates during these months in light trap, *PHW* (47); Bricket Wood Common, 3.vii.56, V instar larva on larch, *EWG* (24); on the boundary at Chorley Wood, 11.viii.16, *EAB* (BM) (11) (12); and beyond at Harpenden, 18.ix.54, *GGES* (HD); and Wymondley, *EAB* (37) (11) (12).

ESSEX. Epping Forest (Theydon Bois), vii.22, *EAB* (BM).

KENT. Blackheath, fairly rare but regularly coming to m.v. light in vii-viii most years since 1959, *AAA* (22); Bostall Wood, *WW* (4); Plumstead, *WW* (4) (22); Bromley, viii.1885, *ES* (HD) (4) (22); West Wickham, *ES* (4) (37) (22); and Shoreham, 1.ix.61, *KCS* (14) (22).

SURREY. Croydon, vii.1880, *ES* (BM) (HD) (37) (3) (62); Shirley, 13.vii.12, on pines, *WW* (60); Headley Lane, *TRB* (37) (3) (62); Mickleham, *EAB* (37) (3); 19.viii.25, *WJA* (SL) (62); Boxhill, *WW* (62); Bookham Common, *WW* (62); Oxshott Heath, 17.vii.60, *DL* (HD); 24.viii.52, *DL* (HD); 2.ix.51, *DL* (HD) (SL); Esher Common, 12.vii.52, *FJC* (1/1952-53, 84) (SL); 13.viii.51, *FJC* (SL); and beyond the boundary at Woking, vii.1890, *ES* (37) (3) (62); Chobham, 29.vi.1895, *ES* (HD); Shere, viii. 1892, *EAB* (BM); *EC* (37) (3); Gomshall, viii.1900, *EAB* (BM) (3); Holmbury, *EAB* (3); Shalford, *EAB* (37) (3) (62); and Ewhurst, viii.1889, *EAB* (BM) (37) (3).

BUCKS. On the boundary at Slough (ICBFS), 23 & 30.vi.33 and 5.vii.34, on *Urtica dioica*, *Abies* sp. and hazel, *WHG* (41); (PILG), 3.vii.53, on spruce, *GEW* (40); and beyond at Amersham, 2.viii.54 on larch, 25.viii.51 on fir, and 23.ix.51 on spruce, *WJLeQ* (21); Penn Wood, 30.ix.51 on larch, *WJLeQ* (21); Burnham Beeches, 21.vi.12, adult and V and IV instar larvae, *EAB* (BM); 9.viii.55, *GEW* (40); and Wendover, 1.viii.54, on spruce, *WJLeQ* (21).

Plagiognathus albipennis (Fall.)

S p. 391

B p. 529 (Sp. 415)

Sp. 277 p. 229

Common and widespread. On Mugwort (*Artemisia vulgaris*) and other species of *Artemisia*, with distinct forms found on each species of host plant, the most common being that on mugwort. There are two generations a year with adults of the first occurring in late June and July, while those of the second generation being present from the end of August until October. Essex records required.

MIDDX. Cripplegate, City of London, 18.vi.55, 23.vii.55 and 28.vii.56 (both ♂♂ and ♀♀ abundant) on *Artemisia vulgaris* colonizing derelict basement bombed site, *EWG* (25); Hampstead Heath, 1949, *DL* (1/1949-50, 36-38)—recorded in error therein as *Microsynamma bohemani*, vide D. Leston *in litt.*); Finchley, 8.vii.44 (dark forms) on *Artemisia vulgaris*, 10.vii.44 on *Artemisia absinthium*, and 21.ix.47 on garden chrysanthemums, *CHA* (17); Harefield, 21.vi.52, *WJLeQ* (21); Ruislip LNR, 1.ix.55, *EWG* (21); vii.64 first adults found, a fairly common species on mugwort, *RAPM* (49); Ealing, 2.viii.37, a single ♀ on *Artemisia vulgaris*, *DCT* (33a); Hounslow Heath, 6.vii.52 on *Artemisia* on rubble tip, *GEW* (40) (33b); 18.viii.56 (a late year) *DL* (54); 14.ix.57, *GEW* (40).

HERTS. Whetstone, 15.ix.61, a single ♀ taken in light trap *PHW* (47); Boreham Wood, 27.vi.60, adults outnumbering the larvae, *DL* (54) (HD); Radlett, 20.vi.60, adults and two V instar larvae swept from mugwort, *DL* (HD) (54) (EMM 97, 66); Watford, 27.vi.60, adults, *DL* (54); and beyond the boundary at Harpenden 31.vii.37 n.c. (probably *DCT*) (BM).

ESSEX. Beyond the boundary at Benfleet, 23.ix.56, *WJLeQ* (21).

KENT. Blackheath, *JAP* (BM); *AAA* (22); Lee, *Bignell* (37) (4) (22); Charlton, *AAA* (22); Plumstead Common, 17.ix.57, *AAA* (22) (51), Eltham, *Bignell* (37) (4) (22); Abbey Wood, *AAA* (22); Abbey Wood marshes, 31.viii.55, *EWG* (24); Bexley (Joyden's Wood), 10.ix.60, *KCS* (14) (22); Ruxley gravel pit, 8.vii.67, *KCS* (14); Darenth Wood, *AAA* (22); 3.ix.64, *KCS* (14); Swanscombe, *AAA* (51); on the boundary at Gravesend, 16.ix.52, ♂♂ and ♀♀ in sandpit on *Artemisia vulgaris*, *TRES* (13); 20.viii.55, *GGES* (HD); Gravesend district, 7.viii.32, *ECB* (NM); and Crockham Hill, 15.viii.51, abundant on mugwort growing on bombed building site, *AMM* (BM).

SURREY. Kew (garden of house in Ennerdale Road) 22.vi.60, on *Artemisia* spp. *HKAS* (7/xxiv, 1961: 169-191); Merton Park (in garden of 24 Springfield Avenue) 18.vii.35, on Southernwood or "old man" (*Artemisia arbrotanum*), *FJC* (1/1935-36, 29) (SL); 18.ix.48, *FJC* (SL); Banstead Downs, *AAA* (51); Cheam (Nonsuch Park), 8.vii.55, *EWG* (24); Reigate, *ES* (37) (3) (62); Boxhill, 27.viii.50, on tansy [sic], *DL* (1/1950-51, 77); Ashtead Woods, 14.ix.47, *FJC* (SL) (62); Bookham Common, 21.vi.55, adults, V and IV instar larvae, *EWG* (24); Weybridge, 30.vi.63 and 22.ix.63, *PSB* (16); and beyond the boundary at Woking, *ES* (3) (62).

BUCKS. Hedgerley, 3.ix.55 and 14.x.55, *GEW* (40); on the boundary at Datchet, 5.ix.55, on Mugwort, *GEW* (40); Datchet Gravel Pit, 5.viii.52, *GEW* (40); Slough (PILG), 4.vii.59, *GEW* (40); and beyond at Latimer, 5.ix.50, *WJLeQ* (21) (EMM 90, 250).

Plagiognathus arbustorum (Fab.)

D&S p. 402

S p. 320

Sp. 278 p. 229

B p. 532 (Sp. 417)

Abundant and widely spread. Found on many different species of

low growing plants, more especially on nettle. The adults are found from June until September. A. A. Allen (*in litt.*) reports finding the occasional melanic specimen in his garden at Blackheath in Kent.

MIDDX. Cripplegate, City of London, 23.vii.55, adults and V instar larvae swept from vegetation colonizing derelict bombed building site, *EWG* (25); St. John's Wood (Finchley Road) N.W.8, 27 & 30.vi.50 and 19 & 24.vii.50, *DL* (54); Hampstead Heath, 29.vii.48, *DL* (54); 24 and 27.vi.49, widespread, *DL* (54) (1/1949-50, 36-38); 5.viii.60, *DL* (54) (HD); Muswell Hill, viii.20, *EAB* (BM); Finchley, 14.vi.43, on *Urtica* and *Verbascum*, *CHA* (17); Edgware (Scratch Wood), 20.vi.60, 18, 22 and 28.vii.60, *DL* (54); 23.vii.60, *DL* (HD) (54); Ruislip LNR, 18.vi.57 (adults, V, IV and III instar larvae), 19.vi.58 (IV and III instar larvae), 27.vi.55 (adult, V and IV instar larvae), 24.vii.56 (adults and V instar larvae), 29.vii.55, all *EWG* (24); a common bug sometimes abundant where nettle is found, III, IV and V instars taken in June-July with main adult population from late June to early September, 1955-58, *EWG* (49); Hounslow Heath, 19 & 26.vii.52, common and generally distributed on the Heath, *GEW* (40) (33b); 26.vii.53, *WJLeQ* (21); 9.viii.53, *DL* (54).

HERTS. Abundant and widely distributed on *Urtica*, *Carduus*, and *Rubus*, *DCT* (12); Barnet, viii.1885, *EAB* (BM); Aldenham, 23.vii.61, *DL* (HD) (54); Boreham Wood, 27.vi.60, adults and larvae, *DL* (HD) (54); Radlett, 26.vi.60, first adults noted in year, *DL* (54); St. Albans, viii.1885, *EAB* (BM); Watford, 27.vi.60, *DL* (HD); Bricket Wood Common, 3.vii.56, adults and V & IV instar larvae, *EWG* (24); Rickmansworth, *EAB* (11); on the boundary at Chorley Wood, 11.viii.16, V instar larva, *EAB* (BM); and beyond at Harpenden, 12.vii.55 and 21.vii.54, *GGES* (HD).

ESSEX. Woodford, 5.viii.25, III instar larva, *EAB* (BM); Epping Forest, n.d., *FP* (HD, presented 1909); common everywhere by sweeping, *CN* (35a); (Theydon Bois), vii.22, adult and IV instar larva, *EAB* (BM); Waltham Abbey, 16.vii.63, *PSB* (16).

KENT. Blackheath, *AAA* (22); Lewisham, 4.viii.1891, *AJC* (HD); Kidbrook Lane, 14.vii.1894 on nettles; Abbey Wood, *AAA* (22); Abbey Wood marshes, 24.vii.54 and 31.viii.55, *EWG* (24); Erith, *JAP* (BM); Bexley, vi and vii, very abundant by sweeping hedgebanks, *D&S* (28) (39); Bromley, vii.1887, *ES* (HD); West Wickham Wood, 7.vii.1894, on nettle, *WW* (60); Farningham Wood, 21.vi.59, 23.vi.62, 2.vii.61 and 9.vii.63, *KCS* (14) (22); Birch Wood, *JAP* (BM); Darenth Wood, vi and vii, very abundant by sweeping hedgebanks, *D&S* (28), 28.v.1893, *ES* (HD); 6.vii.55, V instar larva, *EWG* (24); Horton Kirby, 2.vii.61, *KCS* (14); Fawkham, 22.vii.56, *GGES* (HD); Shoreham, 17.vii.60, *KCS* (14); Westerham, *AAA* (22); Crockham Hill, 15.viii.51, on mugwort on bombed building site, *AMM* (BM); and on the boundary at Sevenoaks, *KCS* (22); and Gravesend, 10.viii.46, sweeping nettles at dusk, *TRES* (13).

SURREY. Tooting Bec, 10.vii.24, IV and III instar larvae, *EAB* (BM); Wimbledon Common, 26.vi.55, *EWG* (24); *FJC* (62); Kew (grounds of Royal Botanic Gardens), 9.viii.60, on hybrid *Verbascum* behind Herbarium, "a common and ubiquitous species frequently swarming on nettle", *HKAS* (7/xxiv, 1961: 169-191); Sunbury-on-Thames, 27.vi.12, *ECB* (NM); Cheam (Nonsuch Park), 22.vii.55, *EWG* (24); Riddlesdown, 12.vii.58, V instar larva, *EWG* (24); Old Coulsdon (Happy Valley), 4.vii.54, *EWG* (24) (EMM 90, xxxix); Banstead Heath, 3.ix.62, *PSB* (16); Reigate, 2.vii.50 (on *Stachys*) and 29.vii.50 (on *Verbascum*), *GBR* (45);

Reigate Hill, 9.vii.49, by sweeping, *GBR* (45); Mickleham, n.d., *FP* (HD, presented 1909); by sweeping amongst flowers on hedgebank, *D&S* (28); Boxhill, 10.viii.13, *WW* (60); *FJC* (62); 7.viii.37, *ECB* (NM); 24.vi.51, *WJLeQ* (21); Ranmore Common, 30.vii.11, *WW* (60) (62); Claygate, *JAP* (BM); Ashtead Common, 20.vii.46, *FJC* (SL) (1/1946-47, 74) (62); Fetcham Downs, 27.vii.52 ♀, *EWG* (24); Bookham Common, *WW* (62); 29.vii.50, *DL* (1/1950-51, 76); vii and viii, *DL* (34); 1953-58, adults and larvae on various dates between June and August, *EWG* (24); Oxshott Heath, 1922-25, on various herbs (e.g. *Teucrium*) in deciduous woodland, also visitor to flowers of *Epilobium* and *Rubus fruticosus* agg., *OWR* (61); 28.vii.57, *GGES* (HD); *FJC* (62); and beyond the boundary at Chobham, 1.viii.1874, *ES* (HD); 4.ix.02, *AJC* (HD); and Horsell, *JAP* (BM).

BUCKS. Hedgerley 7.vii.54, *GEW* (40); on the boundary at Slough (ICBFS), various dates in June and July 1933 and 18.vi.34, on *Heracleum sphondylium*, *Urtica dioica*, thistle and grass, *WHG* (41); (PILG), 26.vii.55, a few beaten from apple, *GEW* (EMM 92, 35); 8.viii.54, *GEW* (40); and beyond at Latimer, 5.vii.65, 26.vii.65 and 4.viii.65, on nettle, *WJLeQ* (21).

Plagiognathus chrysanthemi (Wolff) Sp. 279 p. 230
D&S p. 401 (*P. viridulus*) *S* p. 320 (*P. viridulus*)
B p. 530 (Sp. 416)

Abundant and widespread. Found on many different plants often in company with the previous species particularly on nettle, but where the two occur on this host *P. chrysanthemi* is usually the less numerous. Adults occur from June to September.

MIDDX. Hampstead Heath, 1949, *DL* (1/1949-50, 36-38); 5.vii.52, 5.viii.60 and 15 and 26.viii.50, *DL* (54); 5.viii.60, *DL* (HD); Muswell Hill, viii.20, *EAB* (BM); Finchley, 19.vi.43, on *Verbascum*, *CHA* (17); Edgware (Scratch Wood), 22 & 23.vii.60, *DL* (54) (HD); Harefield, 21.vi.52, 12.vii.52 and 26.viii.51, *WJLeQ* (21); Ruislip LNR, 1955-58, a fairly common species, II instar larvae taken at end of May, V instar in late June, adults frequently swept with previous species (though not usually so numerous) July-early September, *EWG* (49); associated with various Papilionaceae, *RAPM* (49); Hounslow Heath, 26.vi.53, *WJLeQ* (21); 26.vii. & 6.viii.52, locally abundant on *Verbascum* on rubble tip, *GEW* (40) (33b); 9.viii.53, *DL* (54).

HERTS. "Widely distributed in grass, copulation in July", *DCT* (12); Barnet, 27.vi.43, *CHA* (17); Whetstone, 24.vi.60, a single ♂ taken in light trap, *PHW* (47); Aldenham, 23.vii.61, *DL* (HD) (54); Elstree, 22.vi.60, *DL* (HD) (54); Watford, 27.vi.60, *DL* (HD) (54); Bricket Wood Common, 3.vii.56, *EWG* (24); Rickmansworth, *EAB* (11); and on the boundary at Chorley Wood, 17.vii.55, *WJLeQ* (21); and beyond at Harpenden, 7.vii.54, 5.vii.55, 12.vii.54, and 1 & 2.viii.54, *GGES* (HD).

ESSEX. Epping Forest, common everywhere by sweeping, *CN* (35a); (Chingford), 15.vi.12 (V instar larva) and 21.vii.09 (adult), *EAB* (BM).

KENT. Charlton, vi.-ix, very common amongst wayside vegetation, *D&S* (28); *AAA* (22); Blackheath, *AAA* (22); Lewisham (Southend), 31.vii.1897, by sweeping, *WW* (60); Abbey Wood, *AAA* (22); Abbey Wood marshes, 24.vii.54, *EWG* (24); Stone, 4.vii.64, *KCS* (14); Ruxley Gravel pit, 8.vii.67, *KCS* (14); Darenth, vi.-ix, very common amongst

wayside herbage, *D&S* (28); near Darenth, 8.vii.50, sweeping grasses, etc., *TRES* (13); Darenth Wood 6.vii.55, *EWG* (24); Farningham Wood, 9.vii.63, *KCS* (14); Longfield, *AAA* (22); 18.vii.53, *KCS* (14); Magpie Bottom, 25.vi.61, *KCS* (14); Shoreham, 17.vii.60 and 25.viii.64, *KCS* (14) (22); Westerham, *AAA* (22); and on the boundary at Gravesend, 16.viii.51, on *Senecio jacobaea*, *TRES* (13).

SURREY. Banstead Downs, *AAA* (51); Cheam (Nonsuch Park), 8.vii.55, 22.vii.55 and 13.viii.54, *EWG* (24); Sanderstead, vi.-ix, very common amongst wayside vegetation, *D&S* (28); Coulsdon (Old Coulsdon Valley), 4.vii.54, V instar larva, *EWG* (24) (EMM 90, xxxix); Chipstead, 23.vii.11, *ECB* (NM); 11.vii.56, on rock-rose, *GEW* (40); Reigate, *GBR* (62); Boxhill, viii.1892 and 16.vi.17 (III instar larva), *EAB* (BM); 9.viii.-1895, *WW* (60); *FJC* (62); 17.vii.38 and 12.viii.39, *ECB* (NM); Headley Lane, 7.viii.37 and 10.viii.35, *ECB* (NM); Mickleham, vi.-ix, very common amongst wayside vegetation, *D&S* (28); *JAP* (BM); Epsom Common, *FJC* (62); Ashtead Common, 20.vii.46, *FJC* (62) (1/1946-47, 74); Claygate, *JAP* (BM); Bookham Common, 6.viii.1895, *WW* (60); *FJC* (62); 29.viii.50, *DL* (1/1950-51, 76); vii.-ix, *DL* (34); 1953-57, various dates between the months of June to August both adults and III-V instar larvae, common. *EWG* (24); Oxshott Heath, 1922-25, on various herbs in deciduous woodland, *OWR* (61); *FJC* (62); Weybridge, *JAP* (BM); on the boundary at Virginia Water, 10.vii.54, *GEW* (40); and beyond at Woking, ix.1888, *ES* (HD); and Horsell, *FJC* (62).

BUCKS. Datchet, 1.vii.55, *GEW* (40); on the boundary at Slough, 1.viii.53, on tansy, *GEW* (40); Slough (ICBFS), 3.vii.33, 26.vi.34 and 5.vii.34, on *Heracleum sphondylium* *WHG* (41); (PILG) 3.vii.53, *GEW* (40); and beyond at Amersham, 7.vii.51 and 22.vii.56, *WJLeQ* (21); Chesham Vale, 5.vii.52, *WJLeQ* (21); Chalfont St. Peter, 17.vii.25, *EAB* (BM); Latimer, 20.vii.52, 24.vii.54 and 16.viii.52, *WJLeQ* (21); and Burnham Beeches, 24.vii.54 on broom *WJLeQ* (21).

Plagiognathus vitellinus (Scholtz)

Sp. 280 p. 230

B p. 526 (Sp. 411, *Psallus vitellinus*)

Rare. Occurs on spruce and occasionally on larch. It overwinters in the egg stage and adults may be beaten from branches of its host from the end of June until early August. No records as yet from the London areas of Essex and Kent.

MIDDX. Hillingdon, 26.vi.37, a single ♂ on *Pinus sylvestris*, *DCT* (33a); Uxbridge, 20.vi.33, common [sic] on *Abies* sp., *DCT* (33a).

HERTS. Watford, 19.vii.60, *DL* (HD) (54).

SURREY. Just over the boundary at Callowhill, south of Egham, 26.vi.54, single adult on young larch tree by sandpit surrounded by woodland, *GEW* (EMM 90, 233); Virginia Water, 4.vii.59, on spruce, *GEW* (40); and beyond at Horsell Common, 11.vii.37, *ECB* (NM); and Albury, 17.vii.43 *ECB* (NM).

BUCKS. Langley, 8.vii.56, *GEW* (40); on the boundary at Slough (PILG), 26.vi.53, on *Picea*, *GEW* (40) (SL); and beyond at Amersham, 2.viii.54, on spruce, *WLLeQ* (21); Little Chalfont, 10.vii.54, *WJLeQ* (21); Burnham Beeches, 22.vi.12, *EAB* (BM) (38), *EAB* in *WW* coll. (60) and *EAB* in *ECB* coll. (NM), and Lee Common, on spruce *EAB* (38).

Chlamydatus pullus (Reut.) Sp. 281 p. 231
 D&S p. 427 (*Agaliastes pulicarius*) S p. 321 (*Plagiognathus pulicarius*) B p. 534 (Sp. 418)

Local. To be found on low growing plants on dry situations that have bare open patches of ground such as may be found in chalk and sand pits and on ash and rubble tips. The adults have two generations; the first being present from late May to early July; those of the second generation occur from late July until September.

MIDDX. Hounslow Heath, 19 and 26.vii.52, adults and larvae in considerable numbers on rubble tip and round a disused gravel pit beneath *Polygonum aviculare* and *Spergularia rubra*, GEW (33b); 13.viii.52 and 26.v.53, GEW (40); 26.vii.53, WJLeQ (21); 26.vii.53 and 9.viii.53, DL (54); 18.viii.56, a single ♂, many ♀♀ DL (54); 7.viii.53 and 26.vii.53, DL (HD).

ESSEX. Near Grays, 7.ix.38, ♂ and ♀ found running on the soil under *Matricaria* on a bare fallow, DCT (EMM 79, 199).

KENT. Brockley, 10.vi.01, sweeping long grass on railway bank, WW (60) (4) (39) (22); Charlton, AAA (22); Plumstead, 9.ix.1895, AJC (HD); AAA (22); Darenth, 8.vii.50, amongst roots in chalk cutting, TRES (13); Darenth Wood, 31.vii.48, on medick, AMM (BM); 1.viii.49, a single ♂ in pit, AMM (BM) (22).

SURREY. Wimbledon, ES (36); Coombe, vii.1874, ES (HD); West End Common, 10.ix.51, FJC (SL); Weybridge, JAP (BM); and beyond the boundary at Egham, 4.vii.59, GEW (40); Byfleet, FJC (62); Ripley, viii.1900, EAB (BM); Woking, vi. & viii.1888 and viii.1875, ES (HD) (36); Chobham, vii.1880 and viii.1893 (on *Salix*), ES (HD); Horsell Common, 7.viii.33, ECB (NM); Shalford, viii.1886, EAB (BM); and Frensham Heath, AAA (51).

BUCKS. On the boundary at Slough (PILG), viii.61, GEW (40); (Upton Court Road waste plot) 1953-54, occurring among knot grass, black medick, etc., GEW (33d); Slough, 7.viii.54, WJLeQ (21); 23.viii.54, GEW (40); and beyond at Hedgerley, GEW (33d); and Taplow, 28.v.53, in disused sandpit, only a single adult on bare ground was seen though larvae were common, GEW (33d) (EMM 89, 270).

Chlamydatus saltitans (Fall.) Sp. 282 p. 231
 D&S p. 428 (*Agaliastes saltitans*)
 S p. 322 (*Plagiognathus saltitans*) B p. 534 (Sp. 419)

Local. Usually found amongst short grass or at the roots of plants, on dry sandy situations e.g. on heaths, golf links, edges of sand pits, etc. The adults may be found from June to September.

MIDDX. Hampstead, JAP (BM); Hampstead Heath, 19.vii.52, DL (HD) (SL) (54) and DL in WJLeQ coll. (21); Hampton Wick, EAB (37); and Hounslow Heath, 13.viii.52, a few specimens found under *Polygonum aviculare* in disused gravel pit, GEW (40) (33b); 26.v.53 and 15.vi.54, GEW (40).

HERTS. Beyond the boundary at Harpenden (Rothamsted Expt. Station grounds), 7 and 8.ix.53, 2 ♂♂ and 5 ♀♀ amongst short grass on a lawn more than 100 yards from the nearest pond, TRES (EMM 90, 35) (1/1953-54, 43).

KENT. Blackheath, 26.ix.58, a brachypterous specimen under a thick mat of *Trifolium repens* overspreading the edge of a pavement, AAA

(EMM 95, 96) (22); Erith Marshes, *AAA* (22); Darenth Wood, 1.viii.49, amongst sparse herbage on ground in chalk pit, *AMM* (BM) (22); and on the boundary at Gravesend, 1.ix.50, hopping in the sun on lawn at Parrock Manor, *TRES* (13) (22).

SURREY. Wimbledon, *ES* (36); Coombe Wood, vii.1874, *ES* (HD) (3); Reigate *ES* (36); Oxshott Heath, 11.vii.56, *GEW* (40); *AAA* (51); Weybridge *JAP* (BM); and beyond the boundary at Clandon *ES* (3); and Shalford, viii.1886, *EAB* (BM) (3) (37) (62).

BUCKS. On the boundary at Slough (Upton Court Road), 1953-54, on waste plot beneath dead and dying plants of black medick where these were small and isolated, *GEW* (33d); (PILG), various dates, *GEW* (40); and beyond at Taplow, 28.v.53, in disused sand pit, a single adult on the ground, *GEW* (33d) (EMM 89, 270).

Monosynamma bohemani (Fall.) Sp. 285 p. 232

D&S p. 424 (*Neocoris bohemanni*) and p. 425 (*N. Scotti*)

S p. 321 (*Plagiognathus bohemanni* and *P. nigritulus*)

B p. 537 (Sp. 422 *Neocoris bohemanni* and var. *scotti*)

Rare. The majority of the earlier records for this species in Britain were from stable coastal sandhills but just over 15 years ago it was collected inland again after a lapse of many years (*vide* J. A. Power's specimen from Claygate in the British Museum which though undated was probably collected about the 1860's and Newbery's specimen from Kent (see below)). Recently it has now been found at three separate localities in Surrey and Middlesex. Being a small species often not taken other than by diligent searching at the roots of its host plant—the creeping willow (*Salix repens*)—it is not surprising that it has been somewhat overlooked. Occurring in all London Area Home Counties except Bucks., *Salix repens* though restricted to damper heaths and commons, is sometimes locally abundant. Careful search should therefore be made at suitable localities in June and July, during which months the bug reaches the adult state.

MIDDX. Harefield, 21.vi.52, *WJLeQ* (21) (EMM 90, 250).

KENT. West Wickham, 9.vi.12, *EAN* (C).

SURREY. Claygate, *JAP* (BM); Esher Common, 9.vii.51, *FJC* (SL); and just beyond the boundary at Virginia Water, 7.vii.62 ♀ in sandpit, *AMM* (BM); *GEW* (40); 2.vii.66, *AMM* (BM); various dates, *GEW* (EMM 98, 272, and *Entom.*, 100, 217-222).

Campylomma verbasci (Mey.-Dür) Sp 286 p. 232

Local. Occurs on mullein, hollyhock, potato and sometimes on apple and oak. As well as feeding on its host it also is predaceous in all its stages on the Fruit Tree Red Spider Mite (*Metatetranychus ulmi*), aphids, thrips, etc. There are two generations a year; adults of the first occurring from June to August whilst most of the second are found from August to late October.

MIDDX. Finchley, 19.vi.43, on *Verbascum thapsus* in a garden, *CHA* (17) (EMM 81, 163-4); 8.vii.45, in same place, *CHA* (17); Ealing, 4.ix.37, in a garden on hollyhock, *DCT* (EMM 74, 33) (BM); Heston, 27.vii.39, on hollyhock, *HStJKD* (BM) (EMM 75, 208); 11.viii.39, *HStJKD* (BM); Hounslow Heath, 6.viii.52 and 14.vii.53, on rubble tip on *Verbascum thapsus* flower spikes which it damaged considerably, *GEW* (40) (33c); 10.viii.54, *GEW* (40).

HERTS. Beyond the boundary at Harpenden (Rothamsted Expt. Station grounds) taken in light trap, 1 ♂ 17.viii.47, 1 ♀ 3.ix.47, 2 ♂♂ 23.viii.49; 1 ♂ and 2 ♀♀ 27.viii.49; 1 ♂ 1.ix.49; 1 ♂ 3.ix.49, TRES (EMM 90, 35).

ESSEX. Between Rainham and Stanford-le-hope, summer 1938, adults and larvae abundant, up to 2nd week in September, on foliage of field potatoes all around the district "extremely active and observed sucking immature thrips as well as juice from potato shoots", DCT (EMM 79, 199); Tilbury-Grays district, viii.37, abundant on potato plants feeding on thrips in company with *Triphleps laevigatus*, DCT (in litt. to Dr. W. E. China).

KENT. Blackheath, 24.viii.57, a single specimen taken by general sweeping in garden of 63 Blackheath Park, AAA (EMM 95, 96) (22); and beyond the boundary at Gravesend (Milton), 8.viii.49, a large number of adults and larvae on *Verbascum thapsus* flower heads, TRES (HD) (13) (22) (EMM 86, 146); 12.viii.49, TRES (BM); 15.viii.49, TRES (SL); 14.ix.51, TRES (SL); 14.ix.51, DL (HD).

SURREY. Ashtead Common, FJC (62); Oxshott Heath, 19.ix.63, two adults swept from young broad-leaved shoots of sallow occurring in the pine woods, AAA (EMM 100, 4); and beyond the boundary at Woking, FJC (62); Maybury near Woking, FJC (62).

BUCKS. Hedgerley, on mullein, GEW (40).

Campylomma nicolasi Puton & Reut. Sp. 286a p. 313

An alien species from the Mediterranean which was recorded in this country 38 years ago probably imported on nursery stock. There has been no further instance of introduction of this species since that date.

SURREY. Chertsey, 2.vii.30, on apple, C. A. W. Duffield (Rept. Dept. Ent. S.E. Agric. Coll. Wye, 1929-30, 71 (1931)).

Salicarus roseri (H.-S.) Sp. 287 (as *Sthenarus roseri*) p. 233

S p. 319 (*Plagiognathus roseri*) B p. 537 (Sp. 423)

Local. Associated with willow and sallow and occasionally on apple. Adults may be found on the host from mid-June until August.

MIDDX. Edgware (Scratch Wood), 22.vii.60, DL (HD); 22.vii and 23.vii.60, a few ♀♀ only DL (54); Hampton Court, JJF&K in EAB coll. (BM); Harefield, 12.vii.52, on sallow, WJLeQ (21); Hounslow Heath, 22.vi.54, a few larvae on *Salix caprea* which matured a few days later, GEW (40).

HERTS. Aldenham Reservoir, 19 & 20.vi.60, on willow, adults present but outnumbered by V instar larvae, DL (HD) (54) (EMM 97, 66).

KENT. Blackheath, JAP (BM); on *Salix fragilis* in vii, and one only at m.v. light 23.vi.59, AAA (22) (51); Lee (Grove Park), 9.vii.02 (on sallow) and 20.viii.02 (on willow), WW (60) (39); Lewisham (Chapman's Gardens), 28.vii.1896 (on sallow) and 13.vii.1897, WW (60) (39); (Southend), 17.vii.1897, banks of the Ravensbourne, on sallow, WW (60); Catford, 31.vii.1900, WW (60); Dartford, 7.vii.66, on one tree of *Salix alba*, AAA (51); Eltham, JAP (BM); Bromley, vii & viii.1887, ES (HD) (37) (4) (22); Magpie Bottom, 25.vi.51, KCS (14); and Shoreham KCS (22).

SURREY. Battersea, TAM (37); Sunbury-on-Thames, 22.vi.12, ECB (NM); 22.vi.52, sweeping long grass under willow trees, AMM (BM); Ashtead, 11.vii.47, FJC (SL) (62); Boxhill, 21.viii.52, by sweeping, AMM (BM); Oxshott Heath, TRB (37).

BUCKS. On the boundary at Slough (ICBFS), 16, 22 & 30.vi.33, on *Urtica dioica*, *Salix* sp., and hazel, *WHG* (41); (PILG), 1.vii.60, on white willow, *GEW* (40); (PILG), vii.60, beaten from large willow trees, numerous, *GEW* (EMM 96, 128); and beyond at Amersham, 11.vii.53, 12.vii.52 (on willow), 6.vii.52 (on white willow, *Salix alba*), and 1.ix.51, *WJLeQ* (21); 6.vii.52, *WJLeQ* (SL).

Sthenarus rotermundi Scholtz Sp. 288 p. 233
 D&S p. 422 S p. 314 (*Psallus rotermundi*)
 B p. 538 (Sp. 424)

Local. Occurs on white and grey poplar (*Populus alba* and *Populus canescens*) and also on alder (*Alnus glutinosa*). Adults may be found from late June until mid-August.

MIDDX. Hampstead Heath, 18.vii.43, on *Populus alba*, *CHA* (17); Highgate Station, 12.ix.08, *EAB* (BM); Edgware (Scratch Wood), 10.vii.48, on *Populus nigra* and *P. alba*, *CHA* (17); 5.viii.58, *DL* (54); 18.vii.60, adults only on white poplar, *DL* (HD) (54); 22 and 28.vii.60, ♀♀ outnumber ♂♂ *DL* (54); Mill Hill, 5.viii.58, *DL* (HD); Ealing, 2.v.37, I instar larva on *Populus alba*, *DCT* (33a); 11.viii.36, on *Populus alba* *DCT* (33a); and Uxbridge and South Harefield, 31.viii.35, abundant on *Populus alba*, *DCT* (33a).

HERTS. Whetstone, 30.vi.60, a single ♂ and ♀ taken in light trap, *PHW* (47); Elstree, 1943, *CHA* (17); and beyond the boundary at Boxmoor, *AP* (37) (11) (12); and Berkhamsted, vii.36, on *Populus alba*, *DCT* (12).

ESSEX. Woodford, 5.viii.25, *EAB* (BM); and Epping Forest (Loughton), viii.04, *EAB* (BM).

KENT. Blackheath, vii, common on *Populus alba*, D&S (28) (4) (36); 13.vii.1895, under white poplars, *WW* (60); 2.viii.1896, *AJC* (HD); *JAP* (BM); very common in last few years on *Populus alba* in a lane, *AAA* (22) (51); (Shooter's Hill), on *Populus canescens*, various dates, *AAA* (22).

SURREY. Wimbledon Common, 2.vii.48, *FJC* (SL); near Putney Bridge, 2.viii.66, *AAA* (50); Surbiton, viii.1892, *EAB* (BM); Mitcham Common, 23.viii.67, rare, *AAA* (51); Reigate, *ES* (36) (37) (3) (60); Ashtead, 15.vi.48, *FJC* (SL) (62); Boxhill, *FJC* (62); 14.vi.52, *DL* (HD) (SL); Bookham Common, 10.viii.58, adult ♀♀'s beaten from *Populus alba*, *EWG* (24); *DC* in *AAA* coll. (51); and beyond the boundary at Woking, *ES* (37) (3); Chobham, vii.1892, *ES* (HD); Guildford, 30.vi.41, *ECB* (NM); and at Shere, 1887, *EAN* (3) (C).

BUCKS. On the boundary at Datchet (Ditton Park) 10.vi.54, larvae, and ix.53, adults, on suckers of Grey Poplar (*Populus canescens*), *GEW* (EMM 91, 65); 2.vii.54, *GEW* (40); Slough (PILG), 1.vii.56, on grey poplar, *GEW* (40) (EMM 96, 128); and beyond the boundary at Gt. Missenden, 21.vii.51, on white poplar, *WJLeQ* (HD) (21); and Burnham Beeches, 22.vi.12, *EAB* (BM).

Asciodelma obsoletum Fieb Sp. 289 p. 234
 D&S p. 391 (*Tinicephalus obsoletus*) S p. 323
 B p. 539 (Sp. 425)

Local. This bug which overwinters in the egg stage is found on gorse and broom, the adults being present on the host from mid-June until early September.

MIDDX. Hampstead Heath, 7.viii.43, on *Ulex*, *CHA* (17); 21.vi.50 ♂, 5.vii.52 (on gorse), 5.vii.52 (on broom) very abundant, 5.viii.60, and 27.viii.49 (on West Heath), all *DL* and in *(HD)* (54); [The 1949 Hampstead Heath record of *Orthotylus concolor* by D. Leston in source 1/1949-50 36-38 is incorrect and should be under this species (D. Leston *in litt.*)—E.W.G.]; Finchley, 1944, on *Cytisus*, *CHA* (17); and Edgware (Scratch Wood), 26.vii.60, *DL* (54) (*HD*).

HERTS. Whetstone, vi, vii and viii.61, ♂♂ and ♀♀ taken on various dates during these months in light trap, *PHW* (47); Rickmansworth, *DCT* (12); on the boundary at Chorleywood, *EAB* (11); *DCT* (12); and Harpenden, *DCT* (12); 3.viii.54, *GGES* (*HD*).

ESSEX. Epping Forest, common on furze, *CN* (35a); (Loughton), 15.vii.11, *EAB* (*BM*); (Chingford), 15.vii.11, *EAB* (*BM*); and (Theydon Bois), vii.22, adult and V instar larva, *EAB* (*BM*).

KENT. Blackheath, vii, common on furze and broom bushes, *D&S* (28) (4) (22); *AAA* (22); (Shooters Hill), *AAA* (51); Plumstead (Wickham Lane), 30.vi.1894, by beating broom, *WW* (60); Birch Wood, *JAP* (*BM*); Westerham, 24.vii.60, on broom, *AAA* (22) (51); and on the boundary at Gravesend, 21.vii.48, on broom, *TRES* (13).

SURREY. Wandsworth, vii.1875, *ES* (*HD*); Tooting Bec, 10.vii.24, II and I instar larvae, *EAB* (*BM*); Wimbledon Common, 20.vii.48, *FJC* (*SL*); 15.vi.60, *DL* (*HD*); Shirley Common, 14.viii.1897 (on broom) and 11.vii.1896 (on furze), *WW* (62) (60); Reigate, *GBR* (62); Reigate Hill, vii.1873, *ES* (*HD*); Boxhill, 17.vii.38, *ECB* (*NM*); Oxshott Heath, 26.vii.48, *FJC* (*SL*); 1922-25, associated with *Ulex*, *OWR* (61, as *Asciodesma fiebri* in error for this species—E.W.G.); Weybridge, *JAP* (*BM*); on the boundary at Egham, 30.vi.54 and 12.viii.55, *GEW* (40); Byfleet, 24.vi.48, *FJC* (*SL*); Virginia Water, 25.vii.56, *GEW* (40); and beyond at Woking, viii.1888, *ES* (*HD*); and Chobham, vii.1875, *ES* (*HD*); 11.vii.37, *ECB* (*NM*).

BUCKS. On the boundary at Datchet (Ditton Park) on gorse, 31.vii.55, *GEW* (40); Slough (*PILG*), vii.55, *GEW* (40); and beyond at Chalfont St. Peter, 15.vii.25, *EAB* (*BM*); Little Chalfont, 4.vii.53, on broom, *WJLeQ* (21); Burnham Beeches, 24.vii.54, on broom, *WJLeQ* (21); and Longdown Hill, 21.vii.51, *WJLeQ* (21).

Asciodesma fiebri (*D&S*)

Sp. 290 p. 234

D&S p. 420 (*Psallus fiebri*)

S p. 323

B p. 540 (Sp. 426)

Local. This species is associated with Wych Elm (*Ulmus glabra*) on which the adults are present from late June until the end of July.

HERTS. Beyond the boundary at Bovingdon, on Wych elm, *AP* (37) (11) (12); and Boxmoor, vii.1890, on broad leaved elm, *AP* in *EAB* coll. (*BM*).

SURREY. Croydon, vi. and vii, plentiful on palings, *D&S* (*BM*, Co-type) (28) (3) (36) (37); Shirley, vi. and vii, plentiful on palings, *D&S* (28) (36) (37) (3); 11.vii.1896, on elm, *WW* (60); Banstead (Park Downs), 28.vii.55, moderate numbers on one isolated wych elm, *GEW* (EMM 92, 48); Reigate, *ES* (37) (3); Boxhill, *FJC* (62); Oxshott Heath, 28.vii.51, *DL* (*SL*); 12.vii.52 and 15.vii.53, *FJC* (*SL*).

Halodapus rufescens (Burm.) Sp. 291 p. 234
 D&S p. 472 (*Eroticoris rufescens*) S p. 266 (*Allodapus rufescens*)
 B p. 452 (Sp. 323, *A. rufescens*)

Local though sometimes locally common. This species is found on commons and heathland at the roots of heather clumps where it is often in association with ants. The adults occur from July to September. They are normally brachypterous; the macropterous form being very rare.

KENT. Plumstead Common [prior to 1864] several brachypterous specimens at roots of very short heath, D&S (28) (36) (4) (22); vii.1864, a single ♀ of the rare macropterous form, JAP (28) (38) (22) (BM).

SURREY. Reigate Heath, ES (36) (37) (3); Oxshott Heath, 12.vii.52, a single ♂ and ♀ were found in early evening running beneath ling like an active ant possibly *Myrmica sulcinodis* Nye, which nested in that situation, RDW (1/1952-53, 11 and 84) (EMM 88, xxxvi); 24.viii.52, WJLeQ (21); 19.vii.53, locally common amongst heather near roadway, AMM (BM); late July, DL (EMM 94, 70); 27.vii.64, under mat of *Erica cinerea*, AAA (51); and beyond the boundary at Woking, viii.1875, ES (HD) (36) (37) (3); Chobham, vii.1892, ES (HD) (3); Chobham Common, 17.vi.59, two macropterous ♂♂, GEW (EMM 96, 13); 12.viii.56, GEW (40); Horsell, JAP (BM); Leith Hill, viii.1895, EAB (BM) (37) (3); EAB in ECB coll. (NM); Ewhurst, viii.1890, EAB (C) (BM) (3) (37); EAB in WW coll. (60).

BUCKS. On the boundary at Stoke Common, 12.vii.64, WJLeQ (21); and beyond in Hughenden Valley, north of High Wycombe, 23.vii.52, on a chalky hillside, a single brachypterous specimen running rapidly like an ant beneath grass tuft, BJS and GEW (EMM 89, 2) (33d).

Halodapus montandoni (Reut.) Sp. 292 p. 235

Rare. Up to 1959 this species had been reported from only three localities in Britain—Swalecliffe in Kent, Stroud in Gloucestershire, and Berrow sandhills in Somerset. Since that date two further sites in Kent have been discovered, one at Trottiscliffe and the other at Eccles (details below), both just beyond the Society's area. The species seems to favour short turf interspersed with bare earth patches where it has, in the case of the Kentish specimens, been taken running about on the ground in company with the ant *Myrmica scabrinodis*. A search should be made in similar situations within the LNHS boundary for the presence of this bug from late June to the end of August. The bug is predaceous on the immature stages of the ant.

KENT. Beyond the boundary at Trottiscliffe, HKK (22); 25.viii.62, AMM (1/1962, 100); and at Eccles (Gt. Culand chalk pit), 16.vii.60, ♂♂ and ♀♀, AMM (AMM coll. in BM) (1/1960, 16); 17.vii.60, AMM (C); 30.vii.60 and 1.viii.60, AMM (AMM coll. in BM); 23.viii.60, in company with *Systellonotus triguttatus*, AAA (51); 30.vi.65, AMM (AMM coll. in BM).

Systellonotus triguttatus (Linn.) Sp. 293 p. 235
 D&S p. 370 S p. 265 D p. 453 (Sp. 324)

Local. Usually found running about on bare ground patches on open downland, amongst sparse vegetation in chalk pits or on open sandy heaths. It is often associated with the black ant (*Lasius niger*) and the adults occur in July and August. Both the larvae and the adult female are ant mimics.

MIDDX. Hounslow Heath, 19.vii.52, a single adult ♂ and many adult ♀♀ and larvae associated with ants, *Lasius niger*, on one gravel mound, *GEW* (33b); 26.vii.52, *GEW* in *WJLeQ* coll. (21).

KENT. Otford, 2.viii.26 ♂, *ECB* (NM); 8.vii.50, by sweeping on the downs, *AMM* (BM) (22); and just beyond the boundary at Eccles (Gt. Culand chalk pit), 23.viii.60, on ground in company with *Halodapus montandoni*, *AAA* (51).

SURREY. Boxhill, 7.vi.14 ♂, 12.vi.37 ♂, 10.vii.37 ♂, 17.vii.37 ♀♀ and ♂♂, *ECB* (NM); 18.vii.37 ♂, *ECB* (NM), *AMM* (BM); Weybridge, *JAP* (BM); 7.vi.1875, fifty specimens of which 20 were ♀♀, under broom bushes where colonies of *Formica fusca* had made their burrows, *JWD* (3) (37) (38) (10); Woking, vii.1875, *ES* (HD) (37) (3); Chobham, vi.1880, *ES* (HD) (37) (3); vii.1892, freely running among a colony of *Lasius niger*, *ES* (HD) (10); 27.vi.59, *GEW* (10).

Subfamily: DICYPHINAE

There are 10 British species of this world-wide represented subfamily (some of whose members are phytophagous and some predaceous) all of which occur in the London Area.

Macrolophus rubi Woodroffe Sp. 294 p. 237

(*M. costalis* of Woodroffe, *Entom.*, **89**, 37-8)

Macrolophus nubilus (H.-S.) Sp. 295 p. 237

D&S p. 382 S p. 271 B p. 454 (Sp. 325)

The former of these two species was not recognised until 1957 (Woodroffe, 1957, *Entom.*, **90**, 122-125) so the records for *nubilus* (given immediately below) before that date may stand corrected if the voucher specimens, where still extant, can be re-examined. The main differences between these two species are as follows:—

rubi: (found on *Rubus* agg.) has a dark black area to the apex of the scutellum, and the length of the 3rd antennal segment is at least twice that of the 4th.

nubilus: (found on *Stachys sylvatica*) has an entirely green scutellum and the 3rd antennal segment is never more than 1.75 times as long as the 4th.

MIDDX. Hampstead Heath, 1949, *DL* (1/1949-50, 36-38).

HERTS. Just beyond the boundary at Harpenden, 28.vii.35, to light, *DCT* (12).

KENT. Lewisham, *D&S* (4) (22).

SURREY. Reigate, *ES* (3) (62); Boxhill, *FJC* (62).

Authentic *rubi* records are as follows:—

MIDDX. Edgware (Scratch Wood), 30.vii.44, on *Rubus*, *CHA* (17).

ESSEX. Epping Forest (near Connaught Water), on bramble, *CN* (35a).

SURREY. Beyond the boundary at Chiddingfold, 22.vii.37, *ECB* (NM). BUCKS. Just over the boundary at Burnham Beeches, 9.viii.55, on *Rubus*, *GEW* (BM, Holotype and 2 paratypes) (*Entom.*, **89**, 37-8, **90**, 122-125); Hodgemoor Wood, 24.vii.58, *WJLeQ* (21); and beyond at Latimer, 16.viii.52, *WJLeQ* (21).

Authentic *nubilus* records are as follows:—

MIDDX. Edgware (Scratch Wood), 18.vii.60, *DL* (HD) (54); Palmer's Green, 9.vii.19, *EAB* (BM).

HERTS. Barnet, viii.1885, *EAB* (BM); Chorley Wood, 11.viii.16, *EAB* (BM) (11) (12) and *ECB* (NM).

ESSEX. Woodford, 11.viii.25, *EAB* (BM); Walthamstow (Wood St.) 1896, *EAB* in *EAN* coll. (C); Buckhurst Hill, 18.viii.25, *EAB* (BM); Epping Forest (Chingford), 15.vii.11, *EAB* (BM); (Loughton), 14.viii.25, *EAB* (BM); (Wake Arms), vi.1896, *EAB* (BM).

KENT. West Wickham Wood, 8.vii.1899, *WW* (60) (4) (22).

BUCKS. Just over the boundary at Chalfont St. Peter, 17.vii.25, *EAB* (BM); and at Slough (PILG), 31.v.55, 3 examples swept from *Stachys sylvatica*, *GEW* (*Entom.*, 89, 37-8); 15.v.59, *GEW* (40).

Dicyphus constrictus (Boh.) Sp. 296 p. 239

S p. 273 B p. 454 (Sp. 326)

Rare. Adults of this partly predaceous species occur on several plants including *Stachys sylvatica*, *Galeopsis* spp., *Melandrium rubrum* and *M. album*. They should be searched for from the end of July until September, there being fully developed and short-winged forms in both sexes.

HERTS. Aldenham, 23.vii.61, *DL* (HD).

ESSEX. Purfleet, *RML* (5).

KENT. Eynsford, 25.viii.64, *KCS* (14); Downe, 2.x.66, *PJC* (63).

SURREY. Reigate, *GBR* (62); Boxhill, x.09, sweeping in the fields, *WW* (60) (62); and beyond the boundary at Abinger, vii.1899, on *Lychnis dioica*, *EAB* in *EAN* coll. (C); Gomshall, viii.1892, *EAB* in *EAN* coll. (c) (3); Shere, viii.1892, *EAB* (BM) (C) (3) (62); Ewhurst, viii.1896, *EAB* (C); and Chiddingfold, 22.viii.37 and 21.ix.39, *ECB* (NM).

Dicyphus epilobii Reut. Sp. 297 p. 239

D&S p. 380 (*Idolocoris pallidus*)

S p. 272

B p. 455 (Sp. 327)

Common and sometimes locally abundant. Exclusive to the host plant Hairy Willowherb (*Epilobium hirsutum*) on which the adults may be found from mid-July to October. In larger colonies two generations may often occur during the season with a peak in numbers of the larvae in mid-June for the 1st generation (becoming adult by July), and another peak in larvae at end of July for the 2nd generation (adult by the end of August). This species is a phytophagous feeder.

MIDDX. St. John's Wood, N.W.8. (Finchley Road), 16.vii.52 and 13.viii.50, *DL* (54) (HD); Hampstead Heath, 1949, *DL* (1/1949-50, 36-38); Finchley 12.vii.43, on *Epilobium hirsutum*, *CHA* (17); Edgware (Scratch Wood), 22.vii.60, *DL* (HD) (54); 23.vii.60, *DL* (54); Ruislip LNR, 1955-57, abundant, v-ix, larvae and adults in large colony in centre of Reserve, *EWG* (24) (29); Harefield, 19.vii.60, *DL* (54) (HD); Hounslow Heath, 19.vii.52, on *Epilobium* especially in a disused gravel pit, *GEW* (33b) (54).

HERTS. Cheshunt (Lea Valley marshes), 5.ix.57, common, *AAA* (51); Barnet, viii.1895, *EAB* (BM); 27.vi.43, *CHA* (17); Bushey, 25.vii.43, *CHA* (17); Watford (Cassiobury Park), 11.ix.60, *DL* (54); Bricket Wood Common, 3.vii.56, IV and III instar larvae, by sweeping, *EWG* (24); 29.viii.64, *PJLR* (MM); Rickmansworth, 15.viii.16, adults, and 18.viii.16 V, II and I instar larvae, *EAB* (BM); and beyond the boundary at Hatfield, 27.ix.64, *PJLR* (MM); and Wymondley, *EAB* (11).

ESSEX. Epping Forest (Theydon Bois), vii.22, V instar larva, *EAB* (BM); Buckhurst Hill, 15.viii.25, *EAB* (BM); and on the boundary near Harlow, 1.viii.50, sweeping in green lanes, *WAS* (35b).

KENT. Blackheath, common, in garden at 63, Blackheath Park since the appearance several years ago of its food plant *E. hirsutum*, *AAA* (51); (Shooters Hill), *AAA* (22) (51); Charlton, *AAA* (22); Kidbrook (Kidbrook Lane), 18.vii.1896 and 22.ix.1898, *WW* (60) (4) (22) (39); Lewisham, *D&S* (4) (22); Darenth, 22.ix.1890, *DS* (C); *HKK* (22); Darenth Wood, ix.09, *WW* (60); 3.ix.64, *KCS* (14); Dartford, viii.13, sweeping low plants, *WW* (60); Bromley, 30.vii.67, *PJC* (63); Ruxley Gravel pit, 8.vii.67, *KCS* (14); and Westerham, *AAA* (22).

SURREY. Putney, vii.1887, sweeping near Soap Works, *EAN* (C); Coulsdon (Old Coulsdon valley), 4.vii.54, V instar larvae, *EWG* (24); Riddlesdown, 1.viii.53, *EWG* (24); Banstead Downs, 5.vii.57, IV and III instar larvae, *EWG* (24); Reigate, *GBR* (62); Boxhill, x.09, sweeping in the field, *WW* (60); *FJC* (62); Epsom Common, 6.ix.53, ♂ and ♀♀ and V instar larvae, *EWG* (24); Ashtead Common, 26.viii.46 (adult) and 13.ix.48 (V instar larva), *FJC* (SL) (62); Bookham Common, 1953-56, abundant, adults and larvae vii-ix, by sweeping, *EWG* (24); vii, viii, ix and x, *DL* (34); 29.viii.50, *DL* (1/1950-57, 76); 14.viii.60 on *E. hirsutum*, *DL* (HD); 25.vii.64 and 4.ix.65, *PSB* (16); *FJC* (62); Esher Common, 27.vii.51, *HDS* (SL); Ockham Common, ix.1898, *WJA* (60); and beyond the boundary at Chobham Common, viii.1884, *ES* (HD); 22.vii.33, *ECB* (NM); and Leith Hill, viii.1895, *EAB* (BM).

BUCKS. Just beyond the boundary at Chalfont St. Giles, 16.viii.16, III, II and I instar larvae, *EAB* (BM); Amersham, 18.vii.53, *WJLeQ* (21); Latimer, 25.viii.51, *WJLeQ* (21); and Slough (ICBFS), 7.vii.34, on *Epilobium hirsutum*, *WHG* (41); (PILG), 14.vii.53, *GEW* (40).

Dicyphus errans (Wolff) Sp. 298 p. 239
D&S p. 379 (*Idolocoris errans*) S p. 273
B p. 456 (Sp. 328)

Widespread though never present in any large number when found. It occurs on a wide range of plants including *Urtica dioica*, *Verbascum* spp., *Stachys sylvatica*, *Galeopsis* spp., and *Geranium robertianum*. The adults are found from June to October. This species is considered to be partly predaceous.

MIDDX. Buckingham Palace grounds, 1961, a larva believed to be this species was found in ferns, *TRES* (52); St. John's Wood, N.W.8, (Finchley Road), 8.ix.60 in garden on *Stachys*, and 21.x.60, 2 ♂♂ and 1 ♀, *DL* (54); Finchley, 13.vi.43, on *Stachys*, *CHA* (17); 30.x.48, on *Verbascum*, *CHA* (17); Hampstead Heath, 17.vi.49 and 1.x.49, very common on nettles, *DL* (SL) (1/1949-50, 36-38); Harefield, 7.viii.33 and 10.ix.34, common on *Urtica* and *Stachys*, *DCT* (33a); and Uxbridge, 25.viii.35 (mostly nymphs) and 17.ix.35 (all adults), a large colony on *Senecio viscosus*, *DCT* (33a).

HERTS. Whetstone, 23.vi.60, a single ♂ taken in m.v. light trap, *PHW* (47); Radlett, 26.vi.60, V instar larvae, *DL* (54) (EMM 97, 66); Watford, 27.ix.37, *KMG* (SL); and beyond the boundary at Berkhamsted, 19.viii.35, on *Ononis*, *DCT* (12).

ESSEX. Epping Forest (Chingford), 28.v.1890, *EAB* (BM).

KENT. Blackheath, 22.ix.60 and 23.ix.65, in garden at 63, Blackheath Park; 3.ix.57, two adults on *Solanum dulcamara* in garden; 26.vi.60, in parkland, a single adult; sporadic and not obviously associated with any plant; all records of *AAA* (51); Plumstead, 28.x.1893, *AJC* (HD); Abbey

Wood, 2.vii.1898 (SL) (60), 9.vii and 30.vii.1898 (60), all by sweeping red campion, *WW* (60) (4) (39) (22); Lewisham, *D&S* (4) (22); x.1890 and 15.x.1893, *AJC* (HD); Eltham, *D&S* (4) (22); Birch Wood, *JAP* (BM); Darenth, *D&S* (4) (22); Horton Kirby, 17.ix.66, *PJC* (63); Bromley, 24.vi.66, *PJC* (63); Otford, 30.ix.22, *PH* (BM); and beyond the boundary at Gravesend, 8.x.46, on *Solanum nigrum* and *Epilobium montanum*, *TRES* (13).

SURREY. Merton Park, S.W.20, 18.xi.49, on fence, *FJC* (SL) (62); Purley, 22.vi.46, *JLH* (SL); Coulsdon, 3.ix.11, *ECB* (NM); (Old Coulsdon Valley), 4.vii.54, *EWG* (24) (EMM 90, xxxix); Caterham, 21.ix.68, *KCS* (14); Reigate, *WW* (62); Boxhill, 29.viii.1896 and 31.viii.1898, by sweeping, *WW* (60) (62); 17.vi. and 29.vii.49, *FJC* (SL) (62); 18.x.1892, *AJC* (HD); 1.x.55, *DL* (SL); Mickleham, *JAP* (BM); Ashtead Common, *FJC* (62); Bookham Common (Central Wood and Eastern Hollow), 21.vi.55 and 8.vii.56 ♀, swept from *Urtica dioica* and *Stachys sylvatica*, *EWG* (2/37, 57) (24); Oxshott Heath, 17.vi.24 and 8.ix.49, *FJC* (SL) (62); West End Common, 5.x.50, *FJC* (SL) (62); and beyond the boundary at Abinger, viii.1899, *EAB* (BM); Ewhurst, *EAB* (BM); Byfleet, 20.v.17, *EAB* (BM); and Egham, 21.vii.54, *GEW* (40).

BUCKS. Datchet, 18.ix.55, on nettle, *GEW* (40); and just beyond the boundary at Hedgerley, 3.ix.58, on *Verbascum*, *GEW* (40); and Slough (ICBFS), 30.vi. and 2.viii.34, on *Calendula officinalis*, *WHG* (41); (PILG), 30.vi.56, *GEW* (40).

Dicyphus stachydis Reut. Sp. 299 p. 240
S p. 274 B p. 457 (Sp. 329)

Local. The adults of this species that have over-wintered appear from hibernation in May and by the middle of that month eggs are laid. The young pale green larvae which feed on the host-plant Hedge Woundwort (*Stachys sylvatica*) become adult by the end of July or beginning of August. Brachypterous and macropterous forms of both sexes occur though the latter is the least seen.

MIDDX. St. John's Wood, N.W.8 (Finchley Road), 16.vii.60, in garden, V and IV instar larvae on *Stachys*, *DL* (54); Hampstead Heath, 1949, both macropterous and brachypterous forms, *DL* (1/1949-50, 36-38); Ruislip LNR, 22.viii.64, larvae and adults, *RAPM* (49); and Hounslow Heath, 8.viii.53, common on *Stachys sylvatica* in the wood on W. bank of River Crane, north of A.315 road, *GEW* (33c) (54).

HERTS. Barnet, 25.ix.12, *EAB* (BM) (C) (37); (Hadley Wood), 27.vi.43, *CHA* (17); Watford (Cassiobury Park), 11.ix.60, *DL* (54); Chorley Wood, 16.viii.16 (adult and III instar larvae) and 11.viii.16 (II and I instar larvae), *EAB* (BM) (11) (12); Radlett, 26.v.60, *DL* (HD) (54); Panshanger, 20.v.51, *DL* (HD) (54); and just over the boundary at King's Langley, x.18, n.c. (SL); Harpenden, 11.viii.37, on *Stachys sylvatica*, *DCT* (12); 28.vi.55 and 20.ix.54, *GGES* (HD); and beyond at Royston, 14.v.10, 22.v.15, and on *Circaeа lutetiana*, n.d., all *EAB* (BM).

ESSEX. Epping Forest, common on *Stachys sylvatica*, *CN* (35a); (Chingford), vii.1892 and 14.vi.13, *EAB* (BM).

KENT. Kidbrook (Birdbrook), *JAP* (BM); Downe, *AAA* (22); Otford, 16.vii.65, adults and nymphs, *AAA* (51); Westerham (Tower Wood), 17.vi.51, *DL* (1/1951-52, 72) (22); on the boundary at Sevenoaks, *AMM* (22); and just beyond at Trottiscliffe, 25.viii.62, *AMM* (1/1962, 100).

SURREY. Coulsdon, 7.ix.39, *ECB* (NM); (Old Coulsdon Valley), 4.vii.54, *EWG* (24) (EMM 90, xxxix); Banstead Downs, 23.viii.55, *EWG* (24); Reigate, vi.1892, *ES* (HD) (3) (37) (62); Riddlesdown, *AAA* (51); Boxhill, 10.ix.13, sweeping in the field, *WW* (60); 9.vii & 17.vii.38, *ECB* (NM); *FJC* (62); 2.x.55, *EWG* (24); 23.iv.60, *DL* (HD); 1.viii.62, by woodland path, *AAA* (51); Betchworth, *ES* (3); Claygate, *JAP* (BM); Bookham Common, 16.viii.48, *FJC* (SL) (62); 13.v.56, along culvert bank of Lower Eastern pond, *EWG* (24); viii, *DL* (34); Oxshott Heath, *TRB* (3) (37) (62); 15.vii.33, *FJC* (SL); 11.v.60, *DL* (HD); Esher Common, 1.ix.52, *FJC* (SL); Arbrook Common, 7.ix.48 and 21.vii.52, *FJC* (SL) (62); and beyond the boundary at Abinger, viii.1899, *EAB* (BM); Shere, viii.1892, *EAB* (BM) (3); 25.v.1888, *EP* (C); Gomshall, *EAB* (3); Ewhurst, viii.1899, *EAB* (BM) (3); Leith Hill, vi.1900, *EAB* (BM) (3) (62); Shalford, *EAB* (3) (62); Clandon, 21.v.60, *DL* (HD); and Woking, *ES* (3) (37) (62).

BUCKS. On the boundary at Little Chalfont, 11.x.53, *WJLeQ* (21); and Datchet, 18.ix.55, *GEW* (40); and just over the boundary at Chesham (Crowcroft Wood), 24.x.65, *WJLeQ* (21); Amersham, 9.v.53 and 17.iv.55, *WJLeQ* (21); Slough (PILG), various dates, *GEW* (40); and beyond at Burnham Beeches, 18.ix.57, *GEW* (40); 22.viii.65, *WJLeQ* (21); and Coombe Hill, 6.ix.52, *WJLeQ* (21).

Dicyphus pallicornis (Mey.-Dür) Sp. 300 p. 240
 D&S p. 375 (*Idolocoris pallicornis*) S p. 275 (*D. pallidicornis*)
 B p. 459 (Sp. 330, *D. pallidicornis*)

Locally common, occurring wherever foxgloves are to be found. There are two generations a year, the adults of the summer generation becoming adult at the end of July and in August. Both short-winged and fully developed forms occur in each sex, the latter form being the one most often taken. No records available from Essex.

MIDDX. Hampstead Heath, 27.iii.49, *DL* (HD) (54); Finchley, 13.vii.43, on *Digitalis*, *CHA* (17); Ruislip LNR, vi.64, larvae, and vii.64, adults, on the only foxglove in the Reserve, *RAPM* (49).

HERTS. Barnet, viii.1885, *EAB* (BM) (37); West Hyde, 1932, on *Verbascum nigrum*, *DCT* (12); Chorley Wood, 10.viii, 11.viii. & 16.viii.16, *EAB* (BM) (11) (12); St. Albans, *TAM* (37).

KENT. Blackheath, 20.vi. & 26.vi.60, in parkland on foxglove, *AAA* (51); 13.ix.62, on cherry tree in garden at 63, Blackheath Park, *AAA* (51); fairly rare in same garden from 1967, the host-plant having only appeared there a year or two before, *AAA* (51); Plumstead, *D&S* (4) (22) (39); Abbey Wood, 16.vii.1898, on foxgloves, *WW* (60) (4) (39) (22); 30.vii.1898, on foxgloves, *WW* (60) (SL).

SURREY. Wimbledon, *GCC* (3) (37) (62); Merton, 1.vii.48 and 3.viii, 4.viii. & 15.viii.35, garden in Springfield Avenue, on underside of foxglove (*Digitalis* sp.), *FJC* (SL) (1/1935-36, 29 and 1/1941-42, 4) (62); Norwood, *JAP* (BM); Wallington, *JAP*, ♀ (BM); Coulsdon, 6.viii.39, common in garden on *Digitalis*, *ECB* (NM); Reigate *GCC* (3) (62); Boxhill, 31.viii.1898, by sweeping, *WW* (60) (62); Headley Lane, 2.viii.1897, by sweeping, *WW* (60) (62); Esher Common, *GCC* (3) (62); Horsell, *JAP*, ♀ (BM); and beyond the boundary at Shere, *EAB* (3); Gomshall, viii.1892, *EAB* (BM); Ewhurst, *EAB* (3) (62); Shalford, *EAB* (3) (62); and Chilworth (St. Martha's), *FJC* (62).

BUCKS. On the boundary at Datchet, 21.vi.57, *GEW* (40); and just over the boundary at Hedgerley, 22.vii.54, *GEW* (40); Slough (ICBFS),

17.vi.34, on *Digitalis purpurea*, *WHG* (41); (*PILG*), various dates, *GEW* (40); and beyond at Hyde Heath, 14.viii.15, a parasitized ♂, *EAB* (38); Burnham Beeches, 21.vi.56, *GEW* (40).

Dicyphus annulatus (Wolff) Sp. 301 p. 240
 D&S p. 376 (*Idolocoris annulatus*) S p. 276
 B p. 461 (Sp. 332)

Local. Feeds on rest-harrow (*Ononis* spp.). The overwintering adults lay eggs in late spring and the new generation are mature by the end of July or in August. No Essex records available.

MIDDX. Harefield, 2.ix.35, abundant on *Ononis*, *DCT* (33a).

HERTS. Chorley Wood, 16.viii.16, II and I instar larvae, *EAB* (BM); and beyond the boundary at Wymondley, viii.1880, *EAB* (BM) (11).

KENT. Kidbrook (Birdbrook), *JAP* (BM).

SURREY. Purley, 25.viii.45, *JLH* (SL); Addington, 6.x.62, *SL* (1/1962, 104); Warlingham (Halliloo Valley), 29.viii.64, *KCS* (14); Caterham, *GCC* (3) (37) (62); 21.ix.68, *KCS* (14); Reigate, *ES* (3) (37) (62); 14.vii.1898, on southern slopes of N. Downs above the Pilgrim's Way, *WW* (1/1898, 105); 11.vi.1898, by sweeping (with the South London Club), *WW* (60); 2.ix.06, by sweeping *WW* (SL); 26.viii.04, *AJC* (HD); Boxhill, 29.viii.1896, by sweeping, *WW* (60) (62); 12.vi.1893, *AJC* (HD); 21.viii.39 and 30.viii.48, *FJC* (SL); 27.viii.50, *DL* (HD) (1/1950-51, 77); 24.vi.51, *DL* (SL); Headley Lane, 8.x.1897, by sweeping, *WW* (60) (62); Ranmore Common, *EAB* (3); and beyond the boundary at Abinger, viii.1899, *EAB* (BM); Shere, 25.v.-1888, by sweeping chalk down, *EAN* (C) (3); and Gomshall, *EAB* (3).

BUCKS. Just over the boundary at Amersham, 19.ix.53, *WJLeQ* (21); Hedgerley, 5.vii.53, on rest-harrow, *GEW* (40); and beyond at Burnham Beeches, 8.v.15, II instar larva, *EAB* (BM).

Dicyphus globulifer (Fall.) Sp. 302 p. 241
 D&S p. 377 (*Idolocoris globulifer*) S p. 275
 B p. 460 (Sp 331)

Local. Occurs on both the Red Campion (*Silene dioica*)* and the White Campion (*S. alba*)† growing on hedgebanks, by edges of fields and in woods. Larvae hatched from the eggs laid in May occur throughout June and July and early August. The earliest adults may be found on the host plants by the end of July. Essex records required.

MIDDX. Finchley, 12.vii.44, *CHA* (17); Edgeware (Scratch Wood), 23.vii.60, *DL* (54); Ruislip LNR, 22.viii.64, a single adult on Red campion, *RAPM* (49); Uxbridge, 17.viii.35, common on *Lychnis dioica*, *DCT* (33a); Hillingdon, 30.viii.35, common on *Lychnis dioica*, *DCT* (33a); and Hounslow Heath, 1952, locally abundant on *Verbascum* [sic] flowers on the ash and rubble tip, *GEW* (33b) [record possibly doubtful per *GEW* in note to *DL* (54)].

HERTS. West Hyde, 28.ix.34, on *Lychnis dioica*, *DCT* (12); Chorley Wood, 16.viii.16, IV, III and II instar larvae, and 11.viii.16, I instar larva, *EAB* (BM) (11) (12); Panshanger, 20.v.51, *DL* (SL) (54); and beyond the boundary at Royston, vi.19, III instar larva, *EAB* (BM).

* Synonyms: *Melandrium rubrum*; *Lychnis dioica*.

† Synonyms: *Melandrium album*; *Lychnis alba*.

KENT. Charlton, 2.vi.59, on campion, *AAA* (51) (22); Plumstead, *AAA* (22) (51); Abbey Wood, 2.vii.1898, by sweeping *Melandrium rubrum*, *WW* (SL) (4) (39) (22) (60); 9.vii.1898, by sweeping *Melandrium rubrum*, *WW* (SL); *AAA* (51); Abbey Wood Marshes, 24.vii.54, *EWG* (24); Lewisham, *D&S* (4) (39) (22); Eltham, *D&S* (4) (39) (22); Bexley, *D&S* (4) (39) (22); Dartford Marshes, 7.vii.66, on campion, *AAA* (51); Farningham Wood, 24.vi.56, *KCS* (14) (22); Farningham, 15.viii.66, on campion, *AAA* (51); Downe, 15.ix.62, on campion in hedge, *AAA* (22) (51); and Westerham (Tower Wood), 17.vi.51, *DL* (1/1951-51, 72) (22).

SURREY. Shirley, *GCC* (3) (37) (62); Coulsdon, 11.ix.45, n.c. [but probably *JLH*] (SL), Caterham, *GCC* (3) (37) (62); Oxted, 9.vii.12, *AJC* (HD); Mickleham, *JAP*, ♂ and ♀ (BM); *GCC* (3) (37) (62); Boxhill, 5.viii.49, *FJC* (SL); Bookham Common, 20.viii.1894, on *Silene*, *WW* (60) (62); *DL* (34); West End Common, 29.vii.52, *FJC* (SL); Gomshall, viii.1892, *EAB* (BM); Shere, viii.1892, *EAB* (BM) (C) (3); 18.vi.1886, on *Lychnis dioica* in hedges, *EC* in *EAN* coll. (C); Shalford, viii.1886, *EAB* (BM) (3) (62); Horsell, ♂ and ♀, *JAP* (BM); Woking, viii.1888, *ES* (HD) (3) (37) (62); and Chobham, vi.1878 (*ES*) ex BM [*sic*] (C).

BUCKS. On the boundary at Datchet, 3.v.53, on white campion, *GEW* (40); and beyond at Slough (PILG), various dates, *GEW* (40); and Burnham Beeches, 8.v.15, I instar larva, *EAB* (BM).

Campyloneura virgula (H.-S.) Sp. 303 p. 241
D&S p. 373 S p. 276 B p. 462 (Sp. 333)

Locally common. On a number of trees including oak, hazel, hawthorn, and apple. The adults, the male of which is seldom found, occur from late July until October. The species overwinters in the egg state, and both larvae and adults are predaceous on the red spider mite, *Pscopera*, and aphids.

MIDDX. Highgate, *EAN* (C); Palmer's Green, 9.vii.19, IV instar larva, *EAB* (BM); Edgware, 10.vii.48, *CHA* (17); (Scratch Wood), 22.vii. and 26.vii.60 (on ash) and 23.vii.60 (on hornbeam), *DL* (HD) (54); and Ruislip LNR, 24.vii.56 and 29.vii.58, ♀♀ beaten from hawthorn in mixed scrub of West Thicket, *EWG* (49); 18.vii.64, *RAPM* (49).

HERTS. Barnet, viii.1885, *EAB* (BM); Bushey, 25.vii.43, *CHA* (17); Boreham Wood, 27.vi.60, only 2 adults but V-III instar larvae very abundant beaten from ash, *DL* (HD) (54) (EMM 97, 67); Chorley Wood, *EAB* (11); and beyond the boundary at Harpenden, 1.viii.54, *GGES* (HD); and Wymondley, *EAB* (11).

ESSEX. Epping Forest, common by beating trees, *CN* (35a); (Chingford), 8.vii.11, *EAB* (BM).

KENT. Blackheath, early August 1900, on fence, *WW* (60) (4) (39); 29.vi. & 30.vi.59, on beech hedge in garden at 63 Blackheath Park (an early date for adults); also occurs on hawthorn, apple and plum, *AAA* (51); Plumstead, *WW* (39); Lee, *WW* (4) (39) (22); Kidbrook, *WW* (39); Lewisham, viii.1890, *AJC* (HD); Bexley, *D&S* (4) (39) (22); Fawkham, 11.ix.54, *GGES* (HD); Eynsford, 11.viii.34, *FJC* (SL); Bromley, viii.1885, *ES* (HD) (4) (39) (22); 8.viii.66, *PJC* (63); West Wickham, *D&S* (4) (39) (22); Otford, *AAA* (22); and Westerham, *AAA* (22).

SURREY. Shirley Common, ix.1893, by beating holly, *WW* (60) (62); Riddlesdown, 12.vii.58, V or IV instar larva, *EWG* (24); Reigate, 17.viii.16, n.c. (SL); Ashtead, 10.vii.48, 11.vii.47 and 15.viii.46, *FJC* (SL) (62); Headley Lane, 2.viii.1897, beating birch, *WW* (60) (62); Boxhill, *FJC* (62);

9.viii.1895, beaten in the Lane, *WW* (60) (SL); 29.viii.1896, on oak, *WW* (60); vii.17, on nettle, n.c. [probably *WJA*] (SL); 8.vii.40 and 21.vii.41, *FJC* (SL); 7.viii. and 29.viii.37, *ECB* (NM); 16.vi.17, II instar larva, *EAB* (BM); Mickleham Downs, *FPP* (HD); ix.16, n.c. (probably *WJA*) (60); 17.vii.48, *FJC* (SL) (62) (1/1948-49, 73); Bookham Common, 6.viii.1895 and 20.viii.1894, on oak, *WW* (60) (62); 16.viii.48, *FJC* (SL); 2.viii.60, on hazel, *DL* (HD); vii.-ix, *DL* (34); 9.viii.66, *PSB* (16); *AAA* (51); Oxshott Heath, 11.vii.52, *FJC* (SL); Esher Common, *JAP* (BM); 30.vii.51, *FJC* (SL); West End Common, 30.vii.51, *FJC* (SL); and beyond the boundary at Ockham Common, *FJC* (62); Albury, 3.viii.44, *ECB* (NM); by the banks of the Basingstoke Canal between Byfleet and Woking, 8.vii.50, common on oaks, *SL* (1/1950-51, 73); and by the Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50).

BUCKS. On the boundary at Chalfont St. Peter, 15.vii.25, *EAB* (BM); and Slough (ICBFS), 11.vii.33, on *Crataegus oxyacantha*, *WHG* (41); (PILG), 26.vii.55, on apple and willow, *GEW* (EMM 92, 35).

Subfamily: ORTHOTYLINAE

This subfamily of Mirids has 47 British representatives; of these 40 species have so far been recorded within the Society's London Area.

Pilophorus cinnamopterus (Kb.) Sp. 304 p. 243
 D&S p. 359 (*Camaronotus cinnamopterus*) S p. 264
 B p. 469 (Sp. 341)

Local. The adults which are found from July to late September occur on Scots Pine where they are partly predaceous on the black conifer aphids and partly phytophagous on the buds and needles of the tree and the resinous sap exuding from wounds in the bark. No Bucks. records available.

MIDDX. Uxbridge, 8.viii.36, a single V instar nymph on *Pinus sylvestris*, *DCT* (33a).

HERTS. Beyond the boundary at Berkhamsted Common, 12.ix.44, one ♀ beaten off *Pinus sylvestris* with no *Formica rufa* present, *CHA* (EMM 81, 163-4); and Gt. Gaddesden, 1943 or 1944, *CHA* (1/1944-45, 9).

ESSEX. Wanstead, 3.viii.46, *EES* (60); Epping Forest (Chingford), 8.vii.11, V instar larva, *EAB* (BM).

KENT. Plumstead, *D&S* (4) (37) (22); Blackheath, 8.vii.59, a single adult to m.v. light, *AAA* (51).

SURREY. Shirley, 19.ix.1894, *ES* (HD); 11.vii.1896, on pines, *WW* (60); Shirley Common, 26.vii.1895 and 14.viii.1897, on pines *WW* (60) (SL) (62); Reigate, *WW* (62); Oxshott Heath, viii.03, on pines, *WW* (1/1903, 57) (62); 11.ix.15, *WJA* (1/1915-16, 118); vi.-ix, 1919, 1920 and 1922, larvae and adults by beating fir and oak over *Formica rufa* nests, *HStJKD* (10); 2.ix.51, *DL* (HD); 4.ix.51, *HDS* (HD) (SL); 1954, one off pine, *AAA* (51); 11.vii.60, adults and IV and III instar larvae on Scots pine, *DL* (EMM 97, 67); Esher Common, 13.viii.51, 17.ix. and 25.ix.51, *FJC* (SL); (Black Hills), 20.viii.51, *FJC* (SL); Weybridge, *JAP* (BM); 28.vii.19, adults and V and IV instar larvae with *Formica fusca*, *HStJKD* (HD), and *HStJKD* in *EAB* coll. (BM); *TRB* (3) (37) (62); and beyond the boundary at Woking, 13.viii. and 25.viii.04, *ES* (HD); Horsell Common, 7.viii.33, *ECB* (NM); Albury, 3.viii.44, *ECB* (NM); Shere, vii.1887, *EC* in *EAN* coll. (C) (3) (62); Farley Heath, *EAB* (3); Virginia Water, 6.viii.55,

on pine, *GEW* (40); and Ash Vale, 8.ix.51, *WJLeQ* (21); 7.x.51, *AMM* (BM and BM (Massee coll.)).

<i>Pilophorus clavatus</i> (Linn.)	Sp. 305 p. 243
D&S p. 360 (<i>Camaronotus clavatus</i>)	S p. 264
B p. 471 (Sp. 342)	

Rare. The dark red larvae bearing thin yellow bands occur in June and July. They are associated mainly with sallow and more rarely with aspen, oak and Scots pine. Adults may be beaten from the host trees from July to September.

MIDDX. (Leston considered (*pers. comm.*, 1964 in Source 54) that his record for *Pilophorus cinnamopterus* given as "Hampstead Heath, 1949, rare, one only found on sallow with ants" (1/1949-50, 36-38) should probably be *P. clavatus*.—E.W.G.).

HERTS. Barnet, viii.1885, *EAB* (BM) (37); and just over the boundary at Harpenden, 17.viii.34, on *Quercus*, *DCT* (12).

ESSEX. Epping Forest (Loughton), x.14, on sallows, *WW* (60).

KENT. Blackheath, *WW* (39); Lee, *D&S* (4) (37) (22); *WW* (39); Lewisham, *ES* (36); Eynsford, 11.viii.34, *FJC* (SL).

SURREY. Shirley, *WW* (62); Oxshott Heath, *TRB* (3) (37) (62); 23.viii.03, on oaks, *WW* (60) (1/1903, 57) (38); 18.ix.03, on sallows, *WW* (60); 12.vii.52, *DL* (SL) (1/1952-53, 84); 28.viii.61, on sallow, rare, *AAA* (51); Esher Common, 17.ix.51, *FJC* (SL); Weybridge, 21.vi.13, III instar larva, *EAB* (BM); and beyond the boundary at Woking, viii.1895, on sallows, 13.viii.04, ix.07 and ix.1888, *ES* (HD) (3) (36) (37) (62); banks of the Basingstoke Canal between Byfleet and Woking, 8.vii.50, *SL* (1/1950-51, 73); Byfleet, 19.vi.15, III instar larva, *EAB* (BM); 28.vii.41, *FJC* (SL) (62); 8.vii.50, *DL* (HD); Albury, 21.viii.41, *ECB* (NM); Chilworth (Blackheath), 30.viii.36, by general sweeping, *FJC* (1/1936-37, 36) (62); Shalford, *EAB* (3) (37) (62); Wisley, 30.viii.03, or sallow, *WW* (60); and Virginia Water, 21.vii.55, on sallow, *GEW* (40).

BUCKS. On the boundary at Slough (PILG), 24.viii.51, beaten from *Corylus*, *BJS* and *GEW* (EMM 87, 274).

<i>Pilophorus confusus</i> (Kb.)	Sp. 306 p. 243
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Rare. This bug was first taken in Britain in 1955 being found in a disused sand pit at Virginia Water (Woodroffe, 1956, *Entom.*, 89, 84-88), just beyond the boundary of the London Area. It was found on the ground and on low herbage amongst dwarf willows (*Salix repens*). Sites within the LNHS area having similar habitat conditions to that of the Virginia Water locality should be searched during July and August in which months the adults become mature.

SURREY. Virginia Water, 21.vii.55, 6.viii.55 and 2.vii.66 on sallow and creeping willow, *GEW* (40) (*Entom.*, 89, 84-88); 6.viii.55, *GEW* (BM); 7.vii.62, associated with creeping willow, not common, *AMM* (BM in *AMM* coll.).

<i>Pilophorus perplexus</i> D&S	Sp. 307 p. 243
S p. 265	B p. 472 (Sp. 343)

Locally common. On deciduous trees especially oak where it is partly predaceous on woolly aphids, fruit tree red spider mites, and occasionally the young larvae and eggs of lepidoptera. The adults are found from July to October often accompanied by various species of ant

e.g. *Formica rufa*, *F. fusca* and *Lasius niger*. Herts. records wanting.

MIDDX. Hampstead Heath, 7.viii.43, on oak, *CHA* (17); Edmonton, 1900, beaten out of oak, *FBJ* (1/1900, 88); and Hounslow Heath, 14.vii.53, several nymphs accompanied by many ants beaten from oak tree, *GEW* (33c); 8.viii.53, a single adult on same oak tree, *GEW* (33c).

ESSEX. Leyton, 1950, in back garden on various trees and plants in company with ants, *WAS* (35b); Walthamstow, on oak with *Formica rufa*, *CN* (35a); (Wood Street), *EAB* (C); Epping Forest, on trunk of oak in company with *Formica rufa* *EAB* (10) (38).

KENT. Blackheath, 8.vii.1895, *AJC* (HD); Blackheath Park, 9.viii.-1900, on lombardy poplars, *WW* (60) (SL) (4); 12.ix.1900, on lombardy poplars, *WW* (60); on fruit trees chiefly plum in garden at 63 Blackheath Park, rare, *AAA* (51); 6.vii. & 8.vii.59, a few to m.v. light, *AAA* (51); (Shooters Hill), 30.vii.1900, in the shrubbery, on oak, *WW* (60) (SL); 14.viii.1900, on oak, *WW* (60); Lee, *JAP* (BM); *WW* (39); Kidbrook, 30.vii.1897, *AJC* (HD); Lewisham, *D&S* (4) (38) (22); vii.1869, larvae and adults in company with the ant *Formica fusca* on apple, *JWD* (10); *WW* (39); Bexley, 19.vii.1899, with the ant *Lasius niger* on oak stump, *HStJKD* (10) (38); Bromley, *ES* (4) (37) (22); Darent Wood, 12.ix.48, on oak with ants, *AMM* (BM in *AMM* coll.) (22); on the boundary at Seal Chart Woods, near Sevenoaks, 2.ix.52, beating oak, *TRES* (13); and beyond at Trottiscliffe, 25.viii.62, *AMM* (1/1962, 100).

SURREY. Kew Gardens, 28.vii.60, a single adult preying on aphids on *Crataegus monogyna* near S. end of Succulent House. "The aphid colony . . . had been completely exterminated every individual having been sucked dry." A few black ants, probably *Lasius niger*, were also present, *HKAS* (7/xxiv, 1961, 169-191); Putney, by River Thames, vii.1895, *EAN* (C); Surbiton, *ES* (3); Tooting Bec Common, 30.vii.24, on young oak with *A. niger* workers, *HStJKD* (HD) (10); Tooting Bec, 13.vii.24, *EAB* (BM); Norwood, *JAP* (BM); Merton, S.W.20, garden in Springfield Avenue, vii.35, adults and one nymph on apple leaves in company with the ant *Lasius niger*, *FJC* (1/1941-42, 4) (SL) (62); Shirley Common, 28.viii.1897, on fir, *WW* (SL); Bookham Common, 15.vii.49, *FJC* (SL) (62); 9.ix.51, *WJLeQ* (21); vii, *DL* (34); Effingham, 22.vii.49, *FJC* (SL) (62); Oxshott Heath, 14.ix.1895, *AJC* (HD); viii.03, *WW*, (1/1903, 57) (62); ix. and x.15, *WJA* (60); 2.ix.51, *DL* (HD); 4.ix.51 *HDS* (HD) (SL); Esher Common, 8.x.51, *FJC* (SL); Weybridge, *JAP* (BM); *ES* (3) (62); 7.ix.14, in company with the ant *L. fuliginosus* attending aphids on birch, *HStJKD* (10); 18.ix.18, on Scots Pine with *Formica rufa*, *HStJKD* (10); 28.vii.19, on young oak with *Formica fusca* and on other young oaks with *F. rufa*, *HStJKD* (10); Wisley, ix.10, on sallows, *WW* (60) (62); and beyond the boundary on Horsell Common, 26.viii.41, *FJC* (SL) (62); Woking, 13.viii.04 and ix.07, *ES* (HD) (3); 9.v.09, young larvae in nest of *Formica sanguinea*, *HStJKD* (10); 30.viii.10, on Scots pine with *Lasius niger*, *HStJKD* (10); 3.vii.24, larvae running on oak trunk in company with *L. fuliginosus* workers, *HStJKD* (10); Virginia Water, 21.vii.55, *GEW* (40); Chobham, 1874, *ES* (HD); ix.1878, *ES* (BM) (3) (62); 2.viii.1895, *AJC* (HD); Byfleet, 8.ix.35, numerous on oak, *FJC* (SL) (1/1935-36, 28); 12.viii.49, *FJC* (SL); 8.vii.50. *DL* (HD) (SL); Farley Heath, viii.1900, *EAB* (BM); Chilworth, 25.vii. and 31.vii.44 and 3.viii.44, *ECB* (NM); Guildford, 7.vii.43, *ECB* (NM); Wood Street near Guildford, ix.1896, *HStJKD* (HD); ix.1894, *EAB* (BM); and Ash Vale, 4.ix.49, *DL* (HD).

BUCKS. On the boundary at Datchet, various dates, *GEW* (40); and just beyond at Slough (ICBFS) 11.vii.33, on oak, *WHG* (41); (PILG), 26.vii.55, on apple, *GEW* (EMM 92, 35); and Amersham, 1.ix.51, on oak, *WJLeQ* (21).

Halticus apterus (Linn.) Sp. 308 p. 245
 D&S p. 479 (*Halticocoris pallicornis*) S p. 268
 B p. 468 (Sp. 340)

Local. In the London Area this species is associated with various species of leguminous plants and bedstraws. The adults which may be either macropterous or brachypterous are found from late June to the end of August. No records available for Middx. or Bucks.

HERTS. Beyond the boundary at Wymondley, *EAB* (11) (12).

ESSEX. Purfleet, *RML* (5).

KENT. Darenth, *D&S* (4) (36) (37) (22); Swanscombe Park, 30.viii.07, *ECB* (NM).

SURREY. Reigate, *ES* (3) (36) (37) (62); 26.viii.04, *AJC* (HD); 16.viii.03, sweeping the slopes, *WW* (60); Headley, *ES* (36); near Headley Lane, by sweeping, *J&TL* (32); 30.vii.05, ♀ on *Ononis spinosa*, *WW* (60) (62); Boxhill, 26.viii.34 and 21.viii.39, *FJC* (SL) (62); 25.viii.52, *GEW* (40); 25.vii.63, a single adult swept on sheltered hillside, *AAA* (51); Fetcham, 9.viii.1897, *WJA* (SL); Bookham Common, *WW* (62); *DL* (34); and beyond the boundary at Ewhurst, viii.1889 and viii.1896, *EAB* (BM) (3) (62); Shalford, viii.1886, *EAB* (BM) (3) (62); Alfold, 24.viii.07, *ECB* (NM); and Charlwood, *ES* (3).

Halticus luteicollis (Panz.) Sp. 311 p. 245
 D&S p. 480 (*Halticocoris luteicollis*) S p. 267
 B p. 467 (Sp. 338)

Rare. This species occurs on various bedstraws (*Galium* spp.) growing at the edges of woods and rides. The adults may be taken by sweeping the host plants during the months from June to September. There are no records available for Middx., Herts., Essex or Bucks.

KENT. Bromley, vii.1886, *ES* (HD) (37) (4) (22); Darenth Wood, 27.vii.07, *WW* (60).

SURREY. Wimbledon Common, *FJC* (62); Boxhill, *FJC* (62); Mickleham, *JAP* (BM); Bookham Common, 30.vii.51, *DL* (SL) (21); vii. (imagines and larvae), viii, *DL* (34) (63); and beyond the boundary at Byfleet, *FJC* (62); Ewhurst, *EAB* (3) (62); and Shalford, viii.1886, *EAB* (BM) (3) (62).

Strongylocoris leucocephalus (Linn.) Sp. 312 p. 246
 D&S p. 482 (*Stiphrosoma leucocephala*) S p. 269
 B p. 465 (Sp. 336)

Rare. Dry calcareous hillsides and turf banks where rock-rose, lady's bedstraw and harebell occur is the habitat most likely to harbour this species. The adults have been recorded from June to August.

HERTS. Just beyond the boundary at Berkhamsted Common, 26.vi.33, *DCT* (12).

KENT. Darenth (Birch Wood), *JAP* (BM).

SURREY. Barnes, *JAP* (BM) (C); Reigate, *ES* (36); 1902, *HJT* in *WW* coll. (60); Boxhill, 9.vi. and 16.vi.17, *EAB* (BM); swept from grassy slopes

"where *Helianthemum* grew in abundance", *EAB* (38); 31.v.19, III and II instar larvae, *EAB* (BM); 16.vi.17 and 12.vi.37, *ECB* (NM); 23.v.48, *FJC* (SL) (1/1948-49, 70) (62); 24.vi.51, *DL* (SL); Mickleham, *JAP* (BM) (C) (3) (37); *ES* (36) (62); 21.vi.1890, *TRB* (1/1890-91, 36); Esher, *JAP* (BM); Oxshott, *TRB* (37) (62); Chertsey, *TRB* (37) (62); and beyond the boundary at Gomshall, *JAC* (3); 8.vii.51, *HDS* (SL).

BUCKS. Beyond the boundary at Coombe Hill, 11.vii.54, *WJLeQ* (21); and Longdown Hill, 7.vi.54, *WJLeQ* (21).

Strongylocoris luridus (Fall.) Sp. 313 p. 246
S p. 269 B p. 466 (Sp. 337)

Very rare. Has only been recorded at two localities in the London Area and these were probably made nearly a hundred years ago. There are very few localities around London where its food plant the Sheep's Bit (*Jasione montana*) has been found and these have been in short grassy areas on sandy and gravelly soil. The bug should be searched for on its host plant from June to August.

SURREY. Barnes, *JAP* (BM); Weybridge, *D&S* (3) (37) (62); *JAP* (BM) (C); on flowers of *Jasione montana* (38).

Pachytomella parallela (Mey.-Dür) Sp. 314 p. 246

Very rare. Has been taken only once in the London Area and that occasion was the second British record. Elsewhere in Britain it has since been found (though also rarely) at the roots of thick patches of fine grass, especially Creeping Fescue (*Festuca rubra*) where the adults are present from May to the end of August.

ESSEX. Epping Forest (Theydon Bois), vii.22, a single ♂ taken by sweeping, *EAB* (35a).

Orthocephalus coriaceus (Fab.) Sp. 315 p. 247

D&S p. 430 (*Orthocephalus mutabilis*) S p. 270 (*O. mutabilis*)
B p. 465 (Sp. 335, *O. mutabilis*)

Very local. This species has been taken by sweeping in rank grassy areas more especially where tansy, the greater and lesser knapweeds, rest-harrow (*Ononis* spp.) and bedstraws (*Galium* spp.) grow. The black larvae become adult from late June and the mature bugs may be found until the end of August.

MIDDX. Hampton Wick, *ES* (37); Ruislip LNR, 29.vii.55 ♀, *EWG* (24).

HERTS. Berkhamsted Common, 6.vi.47, *CHA* (EMM 81, 163-4).

KENT. Blackheath, 30.vii.66, a single ♂ on *Centaurea nigra* in garden at 63 Blackheath Park, *AAA* (51); Swanscombe, *HKK* (22); and Shoreham, *AMM* (22).

SURREY. Banstead Downs, 8.vii.55, on *Galium verum*, *GEW* (EMM 92, 48); Boxhill, *FJC* (62); 27.viii.50, ♀ on *Tanacetum*, *DL* (HD) (1/1950-51, 77); Claygate, *JAP* (BM); Bookham Common, 30.vi.41, adult ♂ and nymph, *FJC* (SL) (62); 30.vii.51, *DL* (HD); 8.vii.56, *EWG* (24); vii, viii. (including a macropterous ♀), *DL* (34); Weybridge, *D&S* (28) (3) (36) (37) (62); 21.vi.13, IV and III instar larvae, *EAB* (BM); Chertsey, *TRB* (37) (62); and beyond the boundary S.W. of Egham, 1954, on bank separating two arable fields, *GEW* (EMM 91, 54); Woking, vii.1888, *ES* (HD) (37) (3) (62); Chobham, vii.1892, *ES* (HD) (36) (37) (3) (62); 28.ix.1894, *AJC* (HD); Byfleet, *FJC* (62); by Basingstoke Canal between Pirbright Bridge

and Frimley Green, 1954-1955, *HDS* (50); Guildford, 5.vii. and 7.vii.43, 9.vii.41 and 25.vii.44, *ECB* (NM); and Milford, 13.vii.63, *PSB* (16).

BUCKS. On the boundary at Fulmer, 26.vi.55, on grassy bank away from marshy area, *WJLeQ* (21); and beyond at Burnham Beeches, 22.vi.12, ♀, *EAB* (BM).

Orthocephalus saltator (Hahn) Sp. 316 p. 247
D&S p. 431 S p. 270 B p. 464 (Sp. 334)

Occasional. Adults of this species may be taken from July to early September by sweeping in waste places and neglected meadows where it is associated with various plants of the Compositae especially hawkweeds (*Hieracium* spp.). No records available for Essex.

MIDDX. East Barnet (Hadley Common), 25.vi.44, *CHA* (17); Ruislip LNR, 18.vi.57, V and IV instar larvae associated with *Achillea millefolium*, *EWG* (49).

HERTS. Just over the boundary at Harpenden, 17.vii.34, to light, *DCT* (12); and beyond at Wymondley, *EAB* (11) (12).

KENT. Brockley, 1902, *WW* (39) (4) (22); Kidbrook, 2.viii.02, macropterous ♀, *WW* (60); Eltham, *D&S* (4) (39) (22); Darenth, 8.viii.50, amongst grass and black medick roots, *TRES* (13); Darenth, 31.vii.58, *AMM* (22) BM in *AMM* coll.; Swanscombe, 16.viii.62, a few swept from *Picris* sp. in chalk pit, *AAA* (51) (22); Shoreham, 25.viii.64, *KCS* (14); on the boundary at Gravesend, 18.vii.50, by sweeping, *AMM* (BM in *AMM* coll.); and beyond the boundary at Eccles (Culand Chalk Pit), 16.vii.60, a single ♂ by sweeping, *AMM* (BM in *AMM* coll.).

SURREY. Richmond Park, viii.37, ovipositing in the petioles of leaves of *Hieracium* sp., *DCT* (in litt. to Dr. W. E. China); Banstead, 28.vii.55, *GEW* (40); Shirley, *D&S* (28) (62); Headley Lane, 7.viii.1899, ♀, *WW* (60); Boxhill, 18.vii.37 and 7.viii.37, *ECB* (NM); 2.vii.05 and 7.viii.04, *WW* (60) (62); Mickleham, *D&S* (28) (62); Claygate, *JAP* (BM); Oxshott Heath, 29.vi.01, *AB* in *AJC* coll. (HD); and beyond the boundary S.W. of Egham, viii.54 and 22.viii.55, on the top dry part of a bank separating two arable fields on *Hieracium pilosella*, *GEW* (EMM 91, 54) (40); by Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Woking, viii.1888, *ES* (HD); Chobham, vii.1874 and vii.1892, *ES* (HD); 29.vii.1892, *AJC* (HD); 30.viii.36, *ECB* (NM); and Gomshall, viii.1892, *EAB* (BM).

BUCKS. On the boundary at Slough (PILG), 8.viii.54, *GEW* (40); and beyond at Burnham Beeches, 21.viii.54, *WJLeQ* (21).

Malacocoris chlorizans Panz. Sp. 317 p. 249
D&S p. 383 S p. 293 B p. 496 (Sp. 377)

Common and widespread throughout the London Area. The adults which occur from July to September are found on a variety of trees including hazel, elm, lime, apple, and plum. Both larvae and adults are predaceous on aphids, red fruit tree spider mite, and their eggs. The species overwinters in the egg state.

MIDDX. Buckingham Palace grounds, 1961, abundant on hazel; only a single specimen was taken on another tree (lime), *TRES* (52); St. John's Wood, N.W.8 (Finchley Road), 31.vii.51, taken at light, *DL* (1/1951-52, 13); 13.vi.52, 16.vii.52 and 24.vii.50, all on apple, *DL* (HD) (54); Hampstead, 1.viii.43, on *Ulmus*, *CHA* (17); Highgate, 1885, *EAB* (BM); Finchley, 31.vii.43, *CHA* (17); Palmer's Green, 20.ix.20, *EAB* (BM); Harefield,

26.viii.51, on willow, *WJLeQ* (21); Hounslow Heath, 26.vii.52, a few taken by beating in the scrub, *GEW* (33b) (54).

HERTS. Barnet, viii.1885, *EAB* (BM); Whetstone, 31.vii.60, a single ♂ taken in m.v. light trap, *PHW* (pers. comm.) (47); Chorley Wood, 11.viii.16, III and II instar larvae, *EAB* (BM) (11); Bricket Wood, 17.ix.60, 8 ♀♀ on hazel, *DL* (HD) (54); and beyond the boundary at Wymondley, *EAB* (11).

ESSEX. On the boundary near Harlow, 1.viii.50, sweeping in green lanes, *WAS* (35b).

KENT. Blackheath, common, especially on trees, *AAA* (22) (51); repeatedly taken on *Solanum dulcamara* under apple on dates between 28.viii. & 21.ix.57, *AAA* (51); Lee (Hither Green Lane), 8.ix.1894, on hazel, *WW* (SL) (60) (4) (22); Lewisham, *WW* (4) (22); Bexley, *D&S* (28) (4) (22); Darenth Wood, *JAP* (BM); 7.ix.63, *AAA* (22); 7.ix.66, *KCS* (14); Fawkham, 11.ix.54, *GGES* (HD); Farningham Wood, 2.xi.65, *KCS* (14); Eynsford, 15.viii.37, *FJC* (SL) (1/1937-38, 50); and West Wickham, 8.x.1898, *WW* (60).

SURREY. Wimbledon Common, 21.viii.1883, on hazel, *EAN* (C); Purley Downs, *WW* (62); Warlingham, 28.viii.65, *KCS* (14); Shirley Common, 25.ix.1897, *WW* (60) (62); Ashtead Woods, 14.ix.47, *FJC* (SL) (1/1947-48, 71) (62); 25.ix.60, *MGM* (1/1960, 94); Boxhill, 31.viii.1898, *WW* (60) (62); 13.viii.48, *FJC* (SL); 25.vii.52, 27.viii.50 and 14.x.54, *DL* (HD); Mickleham, *D&S* (28) (62); Ranmore Common, 30.vii.11, *WW* (60); 15.ix.42, *FJC* (SL) (62); Bookham Common, 28.ix.37, *FJC* (SL) (62); 12.viii.56 ♂ and 9.x.55, *EWG* (24); 2.viii.60, many V and IV instar larvae (second generation), *DL* (EMM 97, 67); viii. and ix, *DL* (34); Esher Common, 17.ix.51, *FJC* (SL); West End Common, 10.ix.51, *FJC* (SL); and beyond the boundary at Ockham Common, 22.vii.49, *FJC* (SL); Chobham, 1874, n.c. (C); Horsell, *JAP* (BM); by Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Abinger, viii.1900, *EAB* (BM); Gomshall, 19.ix.10, *EAB* (BM); and Guildford, 14.viii.41 ♂♂ and ♀♀, 22.viii.41 ♂♂ and ♀♀, and 9.viii.43 ♂, *ECB* (NM).

BUCKS. Just over the boundary at Chesham, 6.viii.59, on hazel, and 5.ix.64, on apple, *WJLeQ* (21); Amersham, 1.ix.51 (on willow), 4.ix.50 and 8.x.50, *WJLeQ* (21); Slough (PILG), 26.vii.55, on apple, *GEW* (EMM 92, 35); various dates, on hazel, *GEW* (40); and beyond at Burnham Beeches, 9.viii.55, *GEW* (40); and Penn Wood, 29.vii.52, on sallow, *WJLeQ* (21).

Fieberocapus flaveolus (Reut.) Sp. 318 p. 249

S p. 284 (*Cyrtorhinus flaveolus*) B p. 481 (Sp. 354, *C. flaveolus*)

Very local. Damp and marshy situations dominated by tussocks of the Tufted Hair grass (*Deschampsia caespitosa*) and rushes (*Juncus* spp.) around the bases of which the adults of this species may be found from July to early September. No record from Kent available.

MIDDX. Harefield Moor, 5.ix.35, three brachypterous ♀♀ on *Juncus* sp., *DCT* (33a); Hounslow Heath, 26.vii.52, only one or two found as pond was dry but on 13.viii.52 when pond was full, swarms of this species were found in sodden hollows around tufts of *Juncus* sp., *GEW* (33b); 20.vii.53, 12.viii.54 and 19.ix.54, abundant in swamp with macropterous adults of both sexes probably forming 5-10% of total population. One macropterous ♀ taken by sweeping dry grasses on the heath, *GEW* (33c) (54); 9.viii.53, *DL* (HD) (SL) (54).

HERTS. Broxbourne, 18.ix.09, *EAB* (12, as *Cyrtorhinus geminus*) (11).

ESSEX. Orsett, 7.ix.38, macropterous ♂♂ and ♀♀, common amongst *Juncus* sp., *DCT* (in litt. to Dr. W. E. China).

SURREY. Bookham Common, 16.viii.53, by sweeping *Juncus effusus* around margins of S.E. Pond, *EWG* (24); and just beyond the boundary between Horsell Common and Chobham, 16.viii.54, in some numbers in a *Deschampsia* bed, *GEW* (EMM 91, 36); and S.W. of Egham, 19.ix.54 at foot of a bank separating two arable fields, *GEW* (EMM 91, 54) (40).

BUCKS. Just over the boundary at Slough (PILG), 2.viii.58, *GEW* (40).

Cyllecoris histrionicus (Linn.) Sp. 319 p. 250

D&S p. 368 S p. 277 B p. 473 (Sp. 344)

Common and widespread in the London Area. This species is found on oak where both the adults and larvae feed partly on the unopened catkins and very young acorns. They are also part predaceous on aphids and psyllids that occur on the leaves. The earliest adults are found from the beginning of June and although occasional specimens have been taken as late as August most have gone by the end of July.

MIDDX. Highgate, vi.1892, *EAB* (BM); Highgate Wood, 3.vii.1890, by sweeping, *EAN* (C); Stanmore Common, 30.v.60, V instar larvae abundant but no adults, *DL* (54) (EMM 97, 67); Hampstead Heath, 12.vi.43, on oak, *CHA* (17); 8.vi.49, common on oaks, *DL* (HD) (54) (1/1949-50, 36-38); 5.vii.52, on oak, *DL* (HD) (54); 9.vi.57, larvae and adults parasitized, *DL* (EMM 94, 35); 11.vi.57, adults, *DL* (54); 1.vi.60, a few adults (♂ and ♀) but mostly larvae, *DL* (54) (EMM 97, 67); Ruislip LNR, 15.vi.52 ♀, 18.vi.57 ♀♀, and 19.vi.58 ♀♀ and V instar larvae, *EWG* (24).

HERTS. Barnet, viii.1885, *EAB* (BN); (Hadley Wood), 25.vi.44, *CHA* (17); Hatfield, 6.vi.64, *PJLR* (MM); Watford (Whippendell Wood), 3.vi.60, adults (many teneral) and V instar larvae, some parasitized, *DL* (EMM 97, 67); Bricket Wood Common, 3.vii.56, *EWG* (24); Bricket Wood, 14.vii.54, *GGES* (HD); and beyond the boundary at Berkhamsted, 19.vi.33, *DCT* (12); and Ashridge, 28.vi.64, *PSB* (16).

ESSEX. Walthamstow (Wood Street), 7.vii.1890 (by sweeping) and 12.vi.1895 (beaten off oak), *EAN* (C); Higham's Park, vi.1895, *EAN* (C); Epping Forest, vii, common on oaks, *CN* (35a); 20.vi.64, *PJLR* (MM); 5.vii.63, *PSB* (16); (Chingford), 18.vi.10 and vii.07 (adults) and 5.vi.15 (IV, III and II instar larvae), *EAB* (BM); (Loughton), 11.vi.11, by beating, *EAN* (C).

KENT. Blackheath, 18.vi.60 and occasionally since, rare (once on hawthorn), *AAA* (51) (22); (Shooter's Hill), *WW* (39); Kidbrook (Birdbrook), *JAP* (BM); Abbey Wood, *WW* (4) (39) (22); Darent Wood, D&S (28) (4) (22); 28.v.1893, *AJC* (HD); *FPP* (HD); 17.vi.1899 and 18.vi.30, *WJA* (60); 13.vi.66, on oak, common, *AAA* (51); Farningham Wood, 27.v.56, V instar larvae, *EWG* (24); West Wickham Wood, 13.vi.1896 and 7.vii.1894, *WW* (60); 27.vi.1896, *WW* (SL) (60); Westerham (Tower Hill), 17.vi.51, *DL* (1/1951-52, 72) (22); and just beyond the boundary at Ightham, 21.vii.63, *PJLR* (MM); and Sevenoaks (Knole Park), 4.vii.65, *KCS* (14).

SURREY. Coombe, *JAP* (BM); Wimbledon Common, 7.vii.1897, on oak, *EAN* (C); 17.vi.1899, *ECB* (NM); 14.vi.55, *HDS* (60); 25.vi.55, *EWG* (24); Dulwich Wood, 17.vi.04, n.c. (HD); Croydon, *FPP* (HD);

Croham Hurst, *JAP* (BM); Shirley, *JAP* (BM); Shirley Common, 26.vi.-1897, *WW* (60) (62); Riddlesdown, 20.vi.53, *EWG* (24); Chipstead, vi.1900, *WJA* (60); 16.vii.11, *ECB* (NM); Reigate, *GBR* (62); (Redstone Hill), by sweeping, *J&TL* (32); Oxted, 5.iii.1891, *AJC* (HD); Cheam (Nonsuch Park), 8.vii. & 22.vii.55, *EWG* (24); Epsom Common, 27.v.60, 2 larvae beaten from oak, *DL* (EMM 97, 67); Ashtead, 21.vi.47, 15.vi.48, and 16.vi.52, *FJC* (SL) (62); Boxhill, 27.v.16, IV instar larva, *EAB* (BM); *FJC* (62); Mickleham, vi. & vii.16, *WJA* (60); Bookham Common, 28.vi.1898, on oak, *WJA* (60) (SL); 30.vi.41, *FJC* (SL) (62); vi, *DL* (34); Oxshott Heath, vi.16, *WJA* (60); Esher Common, 11.vi.49, *FJC* (SL) (1/1949-50, 75) (62); Arbrook Common, 3.vi.48 and 8.vi.52, *FJC* (SL) (62); Weybridge, 30.vi.63, *PSB* (16); and beyond the boundary at Byfleet, 25.vi.05, *ECB* (NM); *FJC* (62); by the Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Woking, vi.1888, *ES* (HD); Chobham, vii.1892, *ES* (HD); East Horsley, 7.vii.1900, *SL* (1/1900, 16); and Chilworth, 6.vi.44, *ECB* (NM).

BUCKS. Just over the boundary at Slough (ICBFS), 12.vi.34, on oak, *WHG* (41); (PILG), various dates on oak, *GEW* (40); and beyond at Burnham Beeches, 31.vii.54, on hawthorn, *WJLeQ* (21); and Coombe Hill, 7.vii.63, *PSB* (16).

Dryophilocoris flavoquadrivittatus (De Geer) Sp. 320 p. 250

D&S p. 366 (*Globiceps flavonotatus*)

S p. 278 (*Cyllecoris flavonotatus*)

B p. 473 (Sp. 345, *C. flavonotatus* with *C. flavoquadrivittatus* in synonymy)

Locally common. Occurs on oak. Like the previous species this bug is also partly phytophagous on oak catkins and partly predaceous on aphids, insect eggs, etc. The adults have a comparatively short life. Appearing first at the end of May, most of them have died off by the last week of June.

MIDDX. Highgate, vi.1884, *EAB* (BM) (37); Hampstead Heath, 5.vi.49, swept in grass, not common, *DL* (1/1949-50, 36-38) (54); 1.vi.60, adult, *DL* (54); Edgware (Scratch Wood), 28.v.44, *CHA* (17); Ruislip LNR, 13.vi.64, a single adult on *Quercus* sp., *RAPM* (49); and Stanmore Common, 27.v. & 30.v.60, only adults on both dates, *DL* (54).

HERTS. Hatfield, 6.vi.64, *PJLR* (MM); Watford (Whippendell Wood), 3.vi.60, ♀ with ripe eggs, *DL* (54); and beyond the boundary at Berkhamsted, 19.vi.33, on *Quercus*, *DCT* (12); and Harpenden, 14.vi.34, to light, *DCT* (12); 13.vii.54, *GGES* (HD).

ESSEX. Highams Park, 13.vi.1895, on oak, *EAN* (C); vi.1898, *EAB* (BM); Walthamstow (Wood Street), 1886, *G. A. Leacock* in *EAN* coll. (C); Epping Forest (Monks Wood), 11.vi.1892, *DS* (C); (Chingford), 5.vi.15, *EAB* (BM); (between Chingford and Loughton), 28.v.1896, on whitethorn, *WW* (SL) (60); (Loughton), *TRB* (37); (Butters End Corner), on oaks, *CN* (35a).

KENT. Blackheath, 5.vi.60, two adults taken at m.v. light, rare, *AAA* (22) (51); (Shooter's Hill Wood), *WW* (4) (39) (22); Kidbrook, 26.v.1895, *AJC* (HD); Lewisham, on oak very common, *D&S* (28) (4) (22); *WW* (39); Catford, 10.vi.1891, *AJC* (HD); Darenth (Birch Wood), *JAP* (BM); Darenth Wood, *JAP* (BM); 25.viii.1893, *AJC* (HD); *GCC* (4) (37); 13.vi.66, not common, *AAA* (51); Orpington, 3.vi.65, *PJC* (63); West Wickham Wood, *JAP* (BM); Westerham (Hosey Common), 17.vi.51, *DL*

(1/1951-52, 72) (22); and just over the boundary at Sevenoaks (Knole Park), 28.v.64, *KCS* (14).

SURREY. Richmond, 2.vi.55, *LSW* in *LC* coll. (60); Shirley, *JAP* (BM); 13.v.1893, beaten off oaks, *EAN* (C); Chipstead, 9.vi.24, *JLH* (SL); Caterham, 10.v.1893, *AJC* (HD); Reigate, *ES* (37) (62); (Redstone Hill), by sweeping, *J&TL* (32); Boxhill, 21.vii.51, *SL* (1/1951-52, 76); Mickleham, v.1896, *WJA* (SL); Epsom Common, 27.v.60, on oak, *DL* (HD); Ashtead, *TRB* (37); 4.vi.04, *AJC* (HD); Ashtead Common, 24.v.47, common, *FJC* (1/1947-48, 62) (62); Ashtead Forest, 4.vi.05, *ECB* (NM); Claygate, *JAP* (BM); Bookham Common, 5.vi.31, *FJC* (SL) (62); vi, *DL* (34); Oxshott Heath, 1.vi.14, on oak, n.c. (SL); West End Common, 18.vi.58, *FJC* (SL); Arbrook Common, 3.vi.48, *FJC* (SL) (62); and beyond the boundary at Egham, 10.vi.55, *GEW* (40); Byfleet, 27.v.49, *FJC* (SL) (62); 20.vi.16, *EAB* (BM); Chobham, vi.1891, *ES* (HD) (37) (62); Brookwood, *FJC* (62); Leith Hill, 10.vi.16, *EAB* (BM); Chilworth, 8.vi.34, *FJC* (SL) (62); and Farley Heath, 30.v.33, on oak, *FJC* (SL).

BUCKS. Langley, 4.vi.55, *GEW* (40); and just over the boundary at Slough (ICBFS), 22.v.33 and 25.v. & 28.v.34, on oak, *WHG* (41); (PILG), various dates, *GEW* (40); Hodgemoor Wood, 6.vi.53, on oak, *WJLeQ* (21); Amersham, 10.vi.51, *WJLeQ* (21); and beyond at Coombe Hill, 6.vi.64, *PSB* (16).

Globiceps cruciatus Reut.

Sp. 321 p. 251

D&S p. 364 (*G. flavomaculatus*)

S p. 281

B p. 475 (Sp. 347)

Rare. Few London Area records of this species have so far been made. The adults reach maturity in July and continue through to early September. It is associated with dry grassy areas, particularly roadside verges that remain uncut, although it has also been found on creeping willow and bilberry.

MIDDX. Hampton Wick, 1897, *ES* (60) (37) (62).

KENT. Dartford Brent, 2.viii.1863, a single ♂ swept from grass, flowers, etc., *D&S* (28) (4) (37) (22).

SURREY. Reigate, *ES* (3); *GCC* (37) (62); Shirley, *JAP* (BM); Claygate, *JAP* (BM); Bookham Common, viii.1898, *WJA* (SL) (62); viii, *DL* (34); Oxshott, 13.vi.26, *JW* (BM); Weybridge, *JAP* (BM); Chobham, *ES* (37) (3) (62); and just beyond the boundary at Virginia Water, 15.vii.56, *GEW* (40) (EMM 92, 341 and 94, 64).

Globiceps woodroffei Wagner Sp. 322 (as *G. salicicola* Reut.) p. 252

Rare and local. This species was first found in Britain in 1956 (Woodroffe, 1959, EMM 92, 61-65). Although the records mentioned below are from outside the LNHS boundary there is a possibility that they might be found within our area. The adults occur during the months of June and July inhabiting dry heaths where they have been taken beneath heather and dwarf willow.

SURREY. Beyond the boundary on Witley Common, 8.vii.58, *GEW* (40) (*Entom.*, 92, 6-13); 1959, *AMM* (1/1961, 43 and 61 and 1/1963, 1); 18.vi.61, *AMM* in *PJLR* coll. (MM); and Hindhead Common, 13.vii.63, sweeping heath and grass, common, *PSB* (BM) (16).

<i>Globiceps flavomaculatus</i> (Fab.)	Sp. 323 p. 252
D&S p. 363 (<i>G. selectus</i>)	S p. 280
B p. 475 (Sp. 348)	

Rare. Found in damp situations in woodland and along river banks at the base of lush vegetation. It is also, as in the previous species, partly a predaceous and partly a phytophagous feeder. The adults occur from June until September, the male being always the developed winged form while the female is more usually brachypterous.

HERTS. Just over the boundary at Harpenden (Rothamsted Expt. Station grounds), 29.vii.48, a single ♂ in light trap, *TRES* (EMM 90, 35).

ESSEX. Beyond the boundary at Writtle, viii.55, *JHF* (42).

KENT. Kidbrook (Birdbrook), *JAP* (BM); and Eltham, *D&S* (28) (37) (4) (22).

SURREY. Sanderstead, *D&S* (28) (37) (3) (62); *JAP* (BM); Leatherhead, *TRB* (37) (3) (62); Boxhill, 27.viii.50, a brachypterous ♀ taken by sweeping mixed rank herbage, *DL* (HD) (1/1950-51, 77); Weybridge, *D&S* (28) (37) (3) (62); Esher Common, *JAP* (BM); and beyond the boundary at Chobham, vii.1874, viii.1880 and viii.1884, *ES* (HD) (37) (3) (62).

<i>Heterocordylus genistae</i> (Scop.)	Sp. 324 p. 253
D&S p. 432 (<i>H. unicolor</i>) and p. 433 (<i>H. leptocerus</i> D&S nec Kb.)	
S p. 296	B p. 294 (Sp. 375)

Very local. Dyer's Greenweed (*Genista tinctoria*) is the main host of this bug though it is sometimes found on broom. Eggs laid on the plant the previous summer begin to hatch out at the end of May and the larvae pass through the various stadia during the following month. The adults which first appear early in June do not usually survive later than the second week of August.

MIDDX. Edgware (Scratch Wood), 30.vii.44, on *Genista tinctoria*, *CHA* (17) (EMM 81, 163-4); 26.vi.48, *TRE* (SL); 22.vii. and 26.vii.60, many ♀♀ but only a single ♂, *DL* (54) (HD).

ESSEX. Grays, vii.38, on *Cytisus scoparius*, *DCT* (in litt. to Dr. W. E. China).

KENT. Beyond the boundary near Tunbridge Wells, *WB* (22).

SURREY. Oxshott Heath, 6.vii.1895, *AJC* (HD).

<i>Heterocordylus tibialis</i> (Hahn)	Sp. 325 p. 253
D&S p. 434	S p. 296
B p. 495 (Sp. 376, <i>H. tibialis</i> with <i>H. leptocerus</i> Kb. sensu Oshin. Cat. in synonymy)	

Locally common. Occurs on broom, *Sarothamnus scoparius* (*Cytisus scoparius*) and is the earliest Mirid on that host to mature in spring; the first adults being found at the end of May. It is thought that there may be two generations a year. The larvae and adults are both partly predaceous.

MIDDX. Hampstead Heath, 1.vii.1882 and 15.vii.1890, *EAN* (C); 5.vii.52, on broom, *DL* (54) (HD); Finchley, 18.vi.44, on *Cytisus*, *CHA* (17); Uxbridge, 16.vi.33, abundant on *Cytisus*, *DCT* (33a); and Hounslow Heath, 23.vi.53, locally abundant on *Cytisus* on the heath, *GEW* (33c) (54).

HERTS. Just beyond the boundary at Harpenden, 5.vii.54, *GGES* (HD).

ESSEX. Epping Forest (Chingford), vii.1891, *EAB* (BM); (High Beach), v.1893, *EAB* (BM) (35a).

KENT. Plumstead (Wickham Lane), 30.vi.1894, beating broom, *WW* (SL) (60) (4) (39) (22); Lewisham, 9.vi.1892, *AJC* (HD); Darenth (Birch Wood), *D&S* (4) (22); *JAP* (BM); Darenth Wood, 14.v. and 28.v.1893, *AJC* (HD); 8.vi.13, *WW* (60); 13.vi.66, common on broom both in the wood and on the hillside outside, *AAA* (51); Dartford Heath, *D&S* (4) (22); and Farningham Wood, 9.vii.63, *KCS* (14) (22); 25.vi.64, *KCS* (14).

SURREY. Wimbledon, *D&S* (28) (62); Croydon, *D&S* (28) (62); Shirley, *D&S* (24) (62); Shirley Common, vi.1894, on broom, *WW* (60) (62); Reigate (Redstone Hill), by sweeping, *J&TL* (32); Oxted, 11.vi.1893, *AJC* (HD); Oxshott Heath, 4.vi.1892, *AJC* (HD); Esher Common, *JAP* (BM); 29.vi.53, *FJC* (SL); Weybridge, *JAP* (BM); 21.vi.13, *EAB* (BM); on the boundary at Egham, *GEW* (40); and beyond at Byfleet, 24.vi.49, *FJC* (SL) (62); Byfleet Common, 3.vii.39, *FJC* (SL) (62); Chobham, vi.1876, *ES* (HD); 14.vii.36, 30.vi.34 and 14.vi.36, *ECB* (NM); 11.vii.37, ♂ on broom *AMM* (BM in *AMM* coll.); Woking, vi.1891 and vii.1891, *ES* (HD); Brookwood, 4.iv.38, 4.vi.38, 4.vi.39 and 8.vi.31, *FJC* (SL); East Horsley, 7.vii.1900, *SL* (1/1900, 16); Abinger, 12.vi.15, V instar larva, *EAB* (BM); Abinger Hammer, 11.v.12, III instar larva, *EAB* (BM); Chiddingfold, 1898, *HStJKD* (HD); and Ash Vale, 28.v.60, V and IV instar larvae (both parasitized), *DL* (EMM 97, 67).

BUCKS. On the boundary at Little Chalfont, 4.vii.53, *WJLeQ* (21); Stoke Common, 18.vii.53, on broom, *WJLeQ* (21); and beyond at Burnham Beeches, 8.v.15, II and I instar larvae, *EAB* (BM); 13.vi.55, on broom, *GEW* (40); 24.vii.54, 7.vi.57 and 16.vii.64, *WJLeQ* (21); and Coombe Hill, 7.vii.63, *PSB* (16).

Heterotoma planicornis (Fall.) Sp. 326 (as *H. merioptera*) p. 253
D&S p. 438 (*H. merioptera*) S p. 295 (*H. merioptera*)
 B p. 493 (Sp. 374, *H. meriopterum*)

Common and widespread. Frequently occurring in clumps of nettles and on various small shrubs and trees. The adults and the larvae in all stages are both phytophagous (feeding on buds and unripe fruits of plants) and predaceous (feeding on aphids and other small insects), and may be found from July to October. Both sexes of the mature bug exhibit the characteristic widening and flattening of the basal and second antennal segments.

MIDDX. Cripplegate, City of London, 23.vii.55, two adults swept from nettles colonizing basement site of a derelict bombed building, *EWG* (25); Buckingham Palace grounds, 1961, a single specimen was taken on a *Robinia* tree sucker, *TRES* (52); West Kensington, 29.viii, *RGA* (BM); St. John's Wood, N.W.8 (Finchley Road), 19.vii.50, *DL* (HD) (54); 24.vii.50, *DL* (SL); 16.vii.61, on *Ulmus* sp., *DL* (HD); 26.vi. and 30.vi.50 and 1.vii.50, all larvae (those of the first mentioned date being taken on apple), *DL* (54); Hampstead Heath, 1949, rarely met with, one specimen only seen, *DL* (1/1949-50, 36-38); Muswell Hill, vii.20, *EAB* (BM); Finchley, 27.vi.43, *CHA* (17); Edgware (Scratch Wood); 23.vii.60, *DL* (HD) (54); 26.vii.60, *DL* (54); Ruislip LNR, 29.vii.55 and 24.vii.56 (adult ♀♀), 24.vii.56 and 29.vii.58 (V instar larvae), 18.vi.57 (IV and III instar larvae), by sweeping rank vegetation, *EWG* (24) (49); and Hounslow Heath, 19.vii.52, sweeping riverside vegetation by River Crane, *GEW* (33b) (54).

HERTS. D. C. Thomas records this species as being "abundant and widely distributed throughout the county being found on *Urtica*, *Crataegus*, *Cytisus*, *Rubus* and *Solanum tuberosum*. Copulation takes place in August" (12); Barnet, viii.1885, *EAB* (BM); Colney Hatch, *JAP* (BM); Chorley Wood, *EAB* (11); Radlett, 10.viii.58, *DL* (54) (HD); 28.vi.60, V instar larvae very common on hawthorn in company with *Atractotomus mali* adults, *DL* (54); Bricket Wood Common, 3.vii.56, III instar larva, *EWG* (24); Hatfield, 19.vii.64, *PJLR* (MM); and beyond the boundary at Wymondley, *EAB* (11); and Royston Heath, 31.vii.14, sweeping nettles, etc., *GEH* (BM).

ESSEX. Epping Forest (Chingford), 22.vi.11, II instar larva, *EAB* (BM); (Theydon Bois), vii.22, III instar larvae, *EAB* (BM); (Hale End), vi, common by sweeping and beating, *CN* (35a); and beyond the boundary at Danbury Common, 30.vii.60, *JHF* (42).

KENT. Blackheath, on shrubs, trees, hedges, etc., common, *AAA* (51); (Shooter's Hill), *AAA* (22); Abbey Wood, 30.vii.1898, on nettles, *WW*, (SL) (60); Abbey Wood Marshes, 24.vii.54, *EWG* (24); Kidbrook, *WW* (4) (22); Lewisham, 3.viii. & 14.viii.1891, *AJC* (HD); Eltham, *D&S* (4) (22); Bexley, *D&S* (4) (22); Darenth (Birch Wood), *JAP* (BM); Darenth Wood, *D&S* (4) (22); 6.vii.55, V and III instar larvae, *EWG* (24); Fawkham, 22.vii.56, *GGES* (HD); Eynsford, 11.viii.34, *FJC* (SL); Bromley, 8.viii.66, *PJC* (63); West Wickham Wood, 21.vii.1894, on nettles, *WW* (60); Westerham, *AAA* (22); on the boundary at Gravesend, 28.vii.47, on broom, *TRES* (13); 21.vii.48, sweeping nettles, mint, etc., *TRES* (13); 22.vii.52, *GGES* (HD); and just beyond at Wrotham, *KCS* (22).

SURREY. Battersea Park, 12.vii.26, V instar larva, *EAB* (BM); Kew Gardens, 2.vii.46, nymph on *Solanum dulcamara* in Herbarium Expt. Ground, *HKAS* (7/xx, 1948, 113-124); Wimbledon Common, 3.viii.32, *FJC* (SL) (62); 31.vii.56, *HDS* (60); Merton, *JAP* (BM); Merton Park, vii.35, *FJC* (SL) (62); Cheam (Nonsuch Park), 22.vii.55, *EWG* (24); Streatham, 18.viii.62, *PSB* (16); Banstead, 3.ix.62, *PSB* (16); Banstead Downs, *DC* in *AAA* coll. (51); 5.vii.57, V instar larva, *EWG* (24); S. Croydon (Selsdon Road), 8.viii.22, *JLH* (SL); Purley, vii.1896, *WJA* (SL); Chipstead, 14.viii.10, *ECB* (NM); Coulsdon, 20.vii.13 and 12.viii.23, *ECB* (NM); 27.vii.57, *DGH* (57); Riddlesdown, 12.vii.55, V, IV and III instar larvae, *EWG* (24); Warlingham (Halliloo Valley), 2.viii.63, *KCS* (14) (48); Reigate, *GBR* (62); (Oakfield), by beating, *J&TL* (32); Boxhill, 23.vii.22, *FJC* (SL) (62); Mickleham, 19.vii.52, on garden hedge of the "William IV", ♂, *EWG* (24); *D&S* (62); Ashtead Common, 16.viii.48 and 26.viii.46, *FJC* (SL) (62); Claygate, *JAP* (BM); Bookham Common, viii.1898 and vii.15, *WJA* (60); vii.15, *WJA* (SL); 16.viii.48, *FJC* (SL) (62); 27.iii.55 (adult), 8.vii.56 and 10.vii.55 (V instar larvae), 16.vi.57 and 21.vi.-55 (IV instar larvae), and 16.vi.57 (III instar larvae), *EWG* (24); 9.viii.66, *PSB* (16); vii and viii, *DL* (34); near Effingham, 25.viii.68, *PSB* (16); Oxshott Heath, 16.vii.1899, *ECB* (NM); vii.16, *WJA* (60); 18.vii.53, *FJC* (SL); Esher Common, 4.viii.55, *EWG* (24); West End Common, 30.vii.53, *FJC* (SL); Ockham Common, 15.vii.1899, *WJA* (1/1899, 98); Weybridge, 21.vi.13, III instar larva, *EAB* (BM); 22.ix.63, *PSB* (16); and beyond the boundary at Woking, viii.1888 and viii.1890, *ES* (HD); Chobham, 22.vii.34 and 25.viii.34, *ECB* (NM); and Abinger, viii.1900, *EAB* (BM).

BUCKS. On the boundary at Chalfont St. Peter, 15.vii.25 (adult) and 14.vii.25 (V instar larva), *EAB* (BM); and at Slough (IBCF), 3.vii,

6.vii. and 11.vii.34, on hazel, apple, oak, and grass *WHG* (41); (PILG), 26.vii.55, on apple, *GEW* (EMM 92, 35).

Blepharidopterus angulatus (Fall.)

Sp. 327 p. 254

D&S p. 347 (*Aetorhinus angulatus*)

S p. 279 (*A. angulatus*) B p. 474 (Sp. 346, *A. angulatus*)

Common and widespread. Occurs on various trees including oak, elm, lime, birch, willow, alder, apple, etc., where it is partly a predaceous feeder (on fruit tree red spider mites, psyllids, and other small insects) and partly phytophagous. The larvae which develop from mid-May to the end of July soon exhibit the characteristic dark colouration to the "knees" of each leg which has led to this bug's common name of "Black-kneed Capsid". The mature insect is found from June to October and when feeding on apple is responsible for the familiar bump often seen on the outside skin of the fruit. Airy-Shaw (1953, *A.E.S. Bull.*, 12, 94-5) reports the adults of this species as being one of the few regular heteropteran visitors to ordinary house lighting in the London Area. It is a strong flier.

MIDDX. Buckingham Palace grounds, 1961, very abundant on most trees (alder, ash, beech, birch, buckthorn, hawthorn, hazel, lime, oak, poplar (2 species), wych elm, and rhododendron, also taken at light (Sept.), *TRES* (52); St. John's Wood, N.W.8 (Finchley Road), 10.vii.52 and 31.vii.50 on *Tilia*, 3.viii.51 on *Tilia* sp. and *Ulmus* sp., and 10.vii.52, all adults, *DL* (HD) (EMM 95, 97-100); 30.vii. & 7.viii.58, larvae, *DL* (EMM 95, 97-100); Hampstead Heath, 18.vii.43, on *Betula* etc., *CHA* (17); 15.viii.50 and 5.viii.60, *DL* (HD) (54); Palmers Green, 9.vii.19, III instar larva, *EAB* (BM); Edgware (Scratch Wood), 16.vii, 26.vii. & 30.vii.60 (larvae only), 11.viii. & 14.viii.60 (larvae and adults), *DL* (54) (EMM 97, 67); 22.vii, 23.vii. & 31.vii.60 (adults) *DL* (HD) (54) (EMM 97, 67); Ruislip, 7.viii.44, *CHA* (17); Ruislip LNR, 27.vi.55, 29.vii.55, and 1.ix.55 ♀, *EWG* (24); and Hounslow Heath, 8.viii.53, common on *Betula* sp. in the scrub, *GEW* (33c) (54).

HERTS. Whetstone, vii.-ix.60, several specimens (all ♂♂) taken in m.v. light trap *PHW* (*pers. comm.* and 67); Barnet, viii.1885, *EAB* (BM); Aldenham, 23.vii.61, *DL* (54); Chorley Wood, 10.viii.16, III and II instar larvae, *EAB* (BM) (11); Radlett, 23.vii.60, *DL* (54); Cheshunt, 29.viii.18, *EAB* (BM); and just over the boundary near Latimer, Bucks. but inside the Herts. border, 21.viii.54, on poplar, *WJLeQ* (21); and Harpenden, 5.vii.55 and 7.ix.54, *GGES* (HD).

ESSEX. Woodford, 18.viii.25 adult and 7.viii.25 III instar larva, *EAB* (BM); Epping Forest, common on elm, willow and sallow, *CN* (35a).

KENT. Blackheath, *JAP* (BM); *WW* (4) (22); common, most often on ash, elm, and bramble, occurs at m.v. light rather freely, *AAA* (51) (22); (Shooter's Hill), *AAA* (22); Lee, *JAP* (BM); *WW* (4) (22); Lewisham, *D&S* (4) (22); viii.1890, ix.1890, and 20.ix.1891, *AJC* (HD); Catford, 25.viii.1894, on alders, *WW* (60); Dartford, 10.ix.1890, *D&S* (C); Farningham Wood, 28.x.62, *KCS* (14); Bromley, 2.ix.67 and 7.ix.64, *PJC* (63); West Wickham Wood, 21.vii.1894 on oak and on birch, *WW* (60); and Westerham, *AAA* (22).

SURREY. Kew, 1.x.46, a single adult to light in house 2230 hrs. in Lichfield Road, *HKAS* (7/xx, 1948, 113-124); Kew Gardens, 27.ix.46, flying around and alighting on flowers of *Hedera helix* var. *arborescens* by

the Succulent House, *HKAS* (7/xx, 1948, 113-124); 6.viii.60, abundant on hybrid *Sorbaronia alpina* near Temperate House, *HKAS* and *C. Watson* (7/xxiv, 1961, 169-191); Wimbledon Common, 3.viii.12, *FJC* (SL) (62); 29.vii.53, *HDS* (60); Merton Park, 3.vii.47 and 11.viii.49, *FJC* (SL) (62); Streatham, 18.viii.62, *PSB* (16); Beddington Sewage Farm, 11.viii.55, adult and V instar larva, *EWG* (24); Carshalton, 8.vii.56, in garden of house in Carshalton Park Road, II instar larva, *EWG* (24); Cheam (Nonsuch Park), 22.vii.55, V instar larva, *EWG* (24); Banstead, 28.vii.55, *GEW* (40); Banstead Downs, 23.viii.55, V instar larva, *EWG* (24); Purley, 23.ix.45, *JLH* (60); Shirley, before 1893, *WW* (SL); Caterham, 21.ix.68, *KCS* (14); Reigate, *GBR* (62); Boxhill, 7.viii.37, 14.viii.39, 29.viii.37 and 31.viii.36, *ECB* (NM); 30.viii.48, *FJC* (SL) (62); *AAA* (51); a single ♂ beaten from alder on Boxhill, 12.ix.54 by D. Leston was considered by him to be *forma brevicornis* Wagner—a form not previously recorded in Britain (1/1954-55, 15 and 94); Mickleham, 9.x.15, on birch, *FJC* (SL); Epsom Common, 4.x.48, *FJC* (SL); Ashtead Woods, 15.viii.46, *FJC* (SL) (62); Bookham Common, *FJC* (62); 19.vii.53 ♂ on birch, 9.viii.53 ♀ by sweeping *Lotus corniculatus*, and 21.vi.55 II instar larva, *EWG* (24); vii. and ix, *DL* (34); Oxshott Heath, 1922-25, on young birches in the deciduous woodland, *OWR* (61); *AAA* (51); Esher Common, *JAP* (BM); 20.ix. & 29.ix.19, *FJC* (SL) (62); 12.vii.52, *FJC* (1/1952-53, 84); West End Common, 13.viii.51 ♀, *FJC* (SL); Arbrook Common, 7.ix.48, *FJC* (SL) (62); Ockham Common, 23.viii.48 ♀, *FJC* (SL) (62); Effingham, 22.vii.49 ♀, *FJC* (SL) (62); and beyond the boundary at Byfleet, 12.viii.49 and 8.ix.35, *FJC* (62) (SL); Chobham, viii.1884, *ES* (HD); by Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Guildford, 9.viii.43 on elm, and 14.viii.41, *ECB* (NM); and Chiddingfold, 22.viii.37, *ECB* (NM).

BUCKS. On the boundary at Chalfont St. Peters, 15.vii.25, III instar larva, *EAB* (BM); and just over the boundary at Chesham, 28.viii.51, on alder, *WJLeQ* (21); Amersham, 22.viii.53, on lime, *WJLeQ* (21); Slough (ICBFS) 17.vi.33, on hazel, *WHG* (41); (PILG), 26.vii.55, on apple, *GEW* (40) (EMM 92, 35).

Pachylops bicolor (D.&S.) Sp. 328 p. 254

S p. 292 (*Hypsitylus bicolor*) B p. 492 (Sp. 372, *H. bicolor*)

Occasional, though sometimes locally common. The adults of this species occur from July to September being found on gorse and less frequently on broom.

MIDDX. Hampstead Heath, 7.viii.43, on *Ulex* sp., *CHA* (17).

HERTS. Chorley Wood Common, 10.viii.16, III and II instar larvae, *EAB* (BM) (11); Rickmansworth, viii.16, III and II instar larvae, *EAB* (BM).

ESSEX. Woodford, 14.viii.25, *EAB* (BM); Epping Forest, ix.12, *EAB* in *ECB* coll. (NM); (Monk Wood), on furze, *CN* (35a); (High Beach), ix.07, *EAB* (BM); on furze, *CN* (35a).

KENT. Blackheath, *D&S* (4) (22); 1900, *WW* (39); fairly common on gorse, *AAA* (51); very rarely a visitor to m.v. light, a singleton being taken on 24.vii.59, *AAA* (51); Charlton, *D&S* (4) (22); Dartford, 10.ix.1890, *D&S* (C).

SURREY. Barnes Common, 10.ix.51, *HDS* (SL); Wimbledon Common, *FJC* (62); Shirley Common, 20.viii.1898, on furze, *WW* (SL) (60); 10.ix.-1898 and 25.ix.1897, on furze, *WW* (60); Reigate, *ES* (37) (3) (62); Book-

ham Common, 29.vii.50, ♂ sweeping in long grass, *DL* (HD) (1/1950-51, 76) (62); vii, *DL* (34); Oxshott (Princes Coverts), *FJC* (62); Oxshott Heath, *TRB* (37) (3) (62); Esher Common, *JAP* (BM); Egham, 19.ix.54, on gorse, *GEW* (40); Weybridge, 21.vi.13, II instar larva, *EAB* (BM); and beyond the boundary at Byfleet, *FJC* (2); Woking, ix.1888, *ES* (37) (3) (62); Chobham, viii.1874 and viii.1884, *ES* (HD); Ewhurst, *EAB* (37) (3) (62); Gomshall, *EAB* (3) (62); Holmbury, viii.1899, *EAB* (BM); Shalford, *EAB* (37) (3) (62).

BUCKS. On the boundary at Chaifont St. Peter, 14.vii.25, III instar larva, *EAB* (BM); Datchet (Ditton Park), vii.55, *GEW* (40); and just beyond at Stoke Common, 21.viii.54, *WJLeQ* (21); and Hyde Heath, 14.viii.15, II instar larva, *EAB* (BM).

(End of Part VI)

Resumé of the macrolepidoptera of the London Area for 1966 and 1967

By C. G. M. DE WORMS

SINCE the main Review under this title is appearing elsewhere (*Proc. British Ent. and Nat. Hist. Soc.*, in press), it has been considered desirable that a shortened version should be published in the *London Naturalist* as a sequel to the previous biennial Review (*Lond. Nat.*, 45, 89-97, July 1966).

The present treatise will deal with the main facts and features of the two years under review together with the most outstanding captures of the macrolepidoptera made during them. Probably the most important development during the period has been the inauguration of the scheme to map the British lepidoptera on a national scale which has been initiated by Nature Conservancy at its headquarters at Monkswood, Huntingdon. This makes the recording of lepidoptera in the London Area all the more urgent, since the first preliminary distribution maps are already in the process of preparation. The last Review dealt with the records obtained by running a mercury-vapour trap in the grounds of Buckingham Palace and this experiment was continued on suitable occasions during 1966 and 1967 with many interesting additions to the earlier lists.

As regards the weather during the two years, the summer of 1967 was very much better than that of 1966. In fact 1966 was on the whole a very inpropitious season, though there was a big influx of some migrant species both in March and May, mainly the Painted Lady and Humming-bird Hawkmoth. Both were very rare in 1967 which, however, provided a spate of Clouded Yellows, several of which reached the Area in September.

Of the captures of exceptional interest by far the most remarkable was that of a male *Apatura iris* L. (the Purple Emperor) in July 1966 near Northwood by young Mr. J. Majerus. It is probably the first for MIDDLESEX this century, since it died out apparently from the Oxhey area in the last decade of last century. There seems to have been a definite observation of a *Nymphalis antiopa* L. (the Camberwell Beauty) in a Kensington Square in August 1967. *Celastrina argiolus* L. (the Holly Blue), after a prolonged absence, had a good year in 1966 when it was seen in many parts of the Area and again in the spring of 1967.

Of the more outstanding visitors to the Buckingham Palace trap was an example of *Euproctis chrysorrhaea* L. (the Brown-tail) in August 1967, an insect which has not been seen in Central London for a great many years. A female of *Hepialus hecta* L. (the Gold Swift) had occurred in 1965, but only lately recognised, another most improbable species for the Metropolis, since it is a bracken feeder. It may have colonised the old bomb sites. Among the less common migrant moths were *Rhodometra sacraria* F. (the Vestal) and *Nycterosea obstipata* F. (the Gem), both obtained at Wimbledon by Professor J. Dacie in 1967 and 1966 respectively, while *Hadena complta* Schiff. (the Varied Coronet) increased its range in the Area mainly in Kent (K.16) and Surrey (S.17). It was also discovered that the *Amphipyra berbera* Rungs (the Dusky Copper Underwing) was quite prevalent in most parts of the Area. This species was separated in 1967 from *Amphipyra pyramidaea* L. (the Copper Underwing) by the Swedish authority Dr. Svensson.

London can boast of an entirely new species to the British list in the capture at Totteridge in October 1967 of *Caradrina flavirena* Hübn. by Mr. R. I. Lorimer. The insect is essentially of Mediterranean origin.

As to the additional newcomers to each of the Vice-Counties and their more interesting products in 1966 and 1967, for INNER LONDON the Buckingham Palace trap provided as new species to this part of London in *Drepana lacertinaria* L. (the Scalloped Hook-tip)*, a birch feeder, also the tiny *Nola cucullatella* L. (the Short-cloaked)*, *Chesias legatella* Schiff. (the Streak)* in October 1967, a broom feeder, and *Erannis defoliaria* Clerck (the Mottled Umber)* in 1966, while *Pheosia tremula* Clerck (the Swallow Prominent) was new to the trap only. Among butterflies of note was one *Coenonympha pamphilus* L. (the Small Heath)* observed in St. James's Park in May 1967 by Mr. G. H. Gush, apparently the first for Inner London. He also saw there *Pararge aegeria* L. (the Speckled Wood), *P. megera* L. (the Wall), and *Pyrameis cardui* L. (the Painted Lady) in Archbishop's Park, Lambeth in September 1966. *Orgyia antiqua* L. (the Vapourer) was seen flying near the Tate Gallery in October 1967.

Although there were no new species for MIDDLESEX (M.21) during the two years, Mr. G. Prior did some extensive collecting, reporting many Painted Ladies in 1966 in Northwood and North Harrow and a Clouded Yellow in 1967 in Copse Wood. The Holly Blue appeared in numbers at Ealing in 1966. Moths seldom noted in this V.-c. included *Drepana binaria* Hufn. (the Oak Hook-tip), *Euschesis interjecta* Hübn. (the Least Yellow Underwing), *Scopula floslactata* Haworth (the Cream Wave) and *Scopula imitaria* (the Small Blood-vein).

The records for HERTS. (H.20) were of particular interest, especially those of Mr. R. Lorimer who added the following three new species to this V.-c. area. They were *Bomolocha fontis* (the Beautiful Snout)* taken at Totteridge in 1967, a bilberry feeder, *Eupithecia lariciata* Hübn. (the Larch Pug)* obtained there in June 1966 and *Pachycnemia hippocastanaria* Freyer (the Horse Chestnut)* in 1966, essentially of heathland origin. Two unexpected denizens of the chalk also in that locality in July 1967 were *Hemistola immaculata* Thunb. (the Small Emerald) and *Melanthis procellata* Schiff. (the Pretty Chalk Carpet). Among migrants *Nycterosea obstipata* F. (the Gem) appeared in 1966 as it also did in the autumn of 1967 at Bushey among Mr. B. Goater's captures who also reported *Spaelotis raviga* Hübn. (the Stout Dart) from there in that year with *Tethea duplaris* Schiff. (the Lesser Lutestring), a rarity for that district, while an addition to the list for H.20 was *Eupithecia subumbrata* Schiff. (the Shaded Pug)*. *Gypsitea leucographa* Hübn. (the White-marked) reappeared at Watford in March 1967. Mr. G. Prior saw several Clouded Yellows near Rickmansworth in 1966 as well as Painted Ladies. An uncommon insect in that vicinity was *Eulype hastata* L. (the Argent and Sable), while another birch feeder there in the autumn was *Oporinia autumnata* Borkh. (the Autumnal Carpet). The two Burnets, *Zygaena filipendulae* L. (the Six-spot) and *Z. trifolii* Esp. (the Five-spot) were also noted in that region.

For SOUTH ESSEX (E2.18) some captures of note have been made by Mr. K. M. Grimwood again at Ingrave near Brentwood. *Thymelicus lineola* Ochs. (the Essex Skipper) appeared in some new localities, and *Parage aegeria* L. (the Speckled Wood) seemed to be increasing its range.

Among the moths new to the V.-c. list were *Arctia villica* L. (the Cream-spot Tiger)*, also *Eilema complana* L. (the Scarce Footman)* and *Pyrrhia umbra* Hufn. (the Bordered Sallow)*, obtained in 1967. In that year *Euproctis chrysorrhaea* L. (the Brown-tail) appeared in numbers with only one previous V.-c. record. *Hadena compla* Schiff. (the Varied Coronet) had become plentiful by 1966. Further newcomers for E2.18 were *Lygephila pastinum* Treits. (the Blackneck)*, and *Zanclognatha cibrumalis* Hüb. (the Dotted Fanfoot)* in 1966, while 1967 brought *Lobophora halterata* Hufn. (the Small Seraphim)*, *Perizoma alchemillata* L. (the Small Rivulet)*, *Sterrhia vulpinaria* H.-S. (the Least Carpet)*, *Aspitates ochrearia* Röss. (the Yellow Belle)* and *Ennomos autumnaria* Werb. (the Large Thorn)*. *Bapta distinctata* H.-S. (the Sloe Carpet) was common in 1967. A strong colony of *Zygaena trifolii* Esp. (the Five-spot Burnet) was discovered near Ingrave in 1967. Apparently its only previous V.-c. record was in 1865 from Epping Forest.

For KENT (K.16) Mr. D. O'Keefe made some interesting captures at Bexley, among which was *H. corpta* Schiff. (the Varied Coronet)*, new to K.16 which also appeared for Mr. E. J. Hare near Dartford. Other Bexley records for the two years included *Lophopteryx cucullina* Schiff. (the Maple Prominent), *E. complana* L. (the Scarce Footman), *Rhizedra lutosa* Hüb. (the Large Wainscot), also the geometers *Sterrhia sylvestraria* Hüb. (the Dotted Bordered Wave) and *Euphyia cuculata* Hufn. (the Royal Mantle), both taken in 1966. *Sterrhia vulpinaria* H.-S. (the Least Carpet) has colonised that region as well as that of Lee, as reported by Mr. C. G. Bruce who noted a lot of *Leucoma salicis* L. (the White Satin) in that vicinity in 1967. *E. autumnaria* Werg. (the Large Thorn) was common in both areas.

In SURREY (S.17) as before Mr. B. R. Stallwood observed a number of butterflies near Chessington. There were plenty of Painted Ladies and two Clouded Yellows in 1966 with Peacocks abounding in 1967. *T. lineola* Ochs. (the Essex Skipper) was numerous there in both years. Unexpected records from Thorpe in the Chertsey district were *Limenitis camilla* L. (the White Admiral) in 1966 and *Argynnis paphia* L. (the Silver Washed Fritillary) in 1967, both observed by Mr. G. H. Gush who also saw there in 1967 hundreds of Ringlets, Gatekeepers and Meadow Browns, as well as *Thecla quercus* L. (the Purple Hairstreak). In 1967 Mr. P. N. Crow obtained a fine aberration of the Small Copper with hindwing band absent near Wimbledon where Professor J. V. Dacie took *Rhodometra sacraria* L. (the Vestal) in 1966 and *Nycterosea obstipata* F. (the Gem) in 1967. On Bookham Common Mr. C. B. Ashby caught *Odonotosia carmelita* Esp. (the Scarce Prominent) in 1966 and *Tiliacea aurago* F. (the Barred Sallow) and *T. citrago* L. (the Orange Sallow), both not recorded in the 1954 list for that locality. In that year at Cheam he secured *Aporophyla nigra* Haworth (the Black Rustic) and *A. lutulenta* Borkh. (the Deep-brown Dart), not previously noted from that part of S.17. Unusual species in Camberwell in 1967 reported by Mr. S. Wakely were *Scopula promutata* Guen. (the Mullein Wave), *Euphyia unangulata* Haworth (the Sharp-angled Carpet) and *N. obstipata* F. (the Gem). Old records of *Amphipyra berbera* Rungs (the Dusky Copper Underwing) have come from Egham (1872), Wimbledon (1875), Reigate (1866) and

recently from Epsom so that this species is evidently well established in S.17.

Finally for BUCKS. (B.24) new species to this V.-c. recorded by Sir Eric Ansorge near Chalfont St. Giles were in 1966 *Harpyia furcula* L. (the Sallow Kitten)*, *Tethea duplaris* L. (the Lesser Lutestring)*, *Polia tincta* Brahm. (the Silvery Arches)* and *Parascotia fuliginaria* L. (the Waved Black)* which seems to be increasing its range steadily in the Area. In 1967 the only species new to B.24 was *Lygephila pastinum* Treits. (the Blackneck)*. A remarkable newcomer to his trap was *Dicycla oo* L. (the Heart Moth), while other uncommon species for this part of the V.-c., also in 1967, were *Philereme vetulata* L. (the Brown Scallop), *Apeira syringaria* L. (the Lilac Beauty) and *Ectropis extersaria* Hüb. (the Brindled White-spot). Melanic forms of *Tethea ocularis* L. (the Figure of Eighty) and of *Colocasia coryli* L. (the Nut-tree Tussock) also appeared.

The following is an analysis of the number of species of Macrolepidoptera recorded from each of the Vice-counties up to the end of 1967.

VICE-COUNTIES	I.L	M.21	H.20	E2.18	E1.19	K.16	S.17	B.24	TOTALS for the AREA (1967)
BUTTERFLIES ...	24	49	47	51	25	53	54	31	59
MACRO-MOTHS ...	251	538	521	474	241	587	603	417	667
TOTALS ...	275	587	568	525	266	640	657	448	726
INCREASES since 1959 ...	52	3	16	26	1	12	7	28	8
									25

The overall percentage for the London Area up to the end of 1967 stands at 77.9% compared with 78.1% in 1965 in relation to the total number of species recorded in it in proportion to the 1967 total for the United Kingdom.

Ladybird Survey — First Report

By D. G. HALL

THE Entomological Section announced in the *London Naturalist* last year (1968 *Lond. Nat.*, 47, 104) that a survey was being undertaken to investigate the status of six common ladybirds in the London Area.

The objects of the survey were to map the distribution of the following six species: *Coccinella 7-punctata* L., *C. 11-punctata* L., *Adalia bipunctata* L., *A. 10-punctata* L., *Propylea 14-punctata* L. and *Thea 22-punctata* L. and to investigate whether these species have any preference for particular plants. The details requested included name of species, locality, number of specimens, date of observation and name of plant specimen was found on (if any).

Sufficient information has been received to justify a preliminary report. The number of records received were as follows:

<i>Coccinella 7-punctata</i>	7	<i>Adalia 10-punctata</i>	12
<i>Coccinella 11-punctata</i>	3	<i>Propylea 14-punctata</i>	13
<i>Adalia bipunctata</i>	517	<i>Thea 22-punctata</i>	12

In addition *Propylea 14-punctata* and *Thea 22-punctata* were reported in thousands on the grass verges of Staines Reservoir on April 14, 1968. Four separate areas along the half-mile causeway were investigated in some detail and it was estimated that there were literally thousands of both species hibernating between the grass roots.

Coccinella 7-punctata is normally regarded as being the commonest species in gardens after *Adalia bipunctata* but last year only 7 were recorded. One observer in Isleworth was very active in searching for ladybirds and in of a total of 292 observations not one 7-spot was seen. Similarly a group of schoolchildren in Tottenham failed to record the 7 spot out of 92 observations. This suggests, therefore that the 7-spot ladybird was very scarce last year and further study is required. The 10, 11, 14 and 22 spot ladybirds were reported in insufficient numbers to draw any conclusions although the fact that the 14-and 22-spot were seen in thousands at one locality suggests that by diligent searching many more records could be obtained.

During the year several correspondents reported that despite careful searching even *Adalia bipunctata* was scarce. The Norfolk Young Naturalists are also carrying out a survey of ladybirds as they had become aware of a reduced number of sightings in previous years. Despite the considerably larger number of records of *Adalia bipunctata*, too few were received to produce a meaningful distribution map. Out of a total of 2,765 monads in the London Area the species was only recorded in 53. An analysis of the plants on which the species was found also showed that the ladybird may be found on almost any plant or substrate.

This survey, therefore, if not achieving its original aims, has certainly revealed that there may be a substantial reduction in the quantity of ladybirds in the London Area and it is important therefore to continue the survey for a year or two to see if the reduction is real or only temporary.

During 1969 members are asked to continue recording all six species of ladybirds but in particular records of *Coccinella 7-punctata* would be welcome. As many records of *Adalia bipunctata* are also required from as many localities as possible so that an attempt can be made to compile a distribution map of the species. Observations on the feeding habits of adult ladybirds are also required.

I should like to thank all those members who sent in records last year. For those who wish to participate this year, aids to the identification of the species and recording sheets may be obtained from my address, 7 Sutherland Avenue, Cuffley, Herts.

LIST OF RECORDERS

E. B. Bangerter, Dr. G. Beven, Miss J. E. Compton, Mrs. F. N. Harris, A. M. Hutson, Miss B. Johnson, Miss M. E. Kennedy, R. G. Lees, A. E. Le Gros, D. A. Lilliman, M. G. Shaw, K. C. Side, Mrs. J. Small, Mr. and Mrs. W. G. Small, M. Towns, Mrs. A. Warren and Mr. Wright.

Survey of Bookham Common

TWENTY-SEVENTH YEAR

Progress Report for 1968

GENERAL (G. Beven)

C. P. Castell is slowly recovering from his severe illness, but remains seriously disabled and is still unable to take an active part in the survey. The Research Centre, in the grounds of the Keeper's cottage, has been named the Castell Research Centre in recognition of his outstanding services to the Survey over 26 years.

A petrological microscope, previously generously presented by L. Manns, has now been exchanged (with his permission) through the kindness of Mr. E. P. Herlihy, for his Crouch-Wenham type binocular microscope, which is likely to be of more general use to the Survey.

Further books have been added to the Research Centre's library, including several books, identification keys and articles kindly donated by A. E. Le Gros, and a long series of the *London Naturalist* by J. F. Shillitoe. Through the good offices of Dr. A. S. Thorley a very fine work bench has been constructed; and in August a working party consisting of Miss E. M. Hillman, F. C. Reeves, Dr. A. S. Thorley and the writer did some cleaning and repainting of the hut. Mr. E. F. Youngman, the Keeper, has been most helpful to the Survey team in many ways, especially in connection with the Research Hut.

During the year the Survey team was pleased to welcome the Quekett Microscopical Club and the British Mycological Society on their visits to the Common. In May some members of the Teenagers' International Entomologists Group (T.I.E.G.) joined in operating a mercury vapour light trap from the Research Centre in order to record the moths. Two university students camped near the Common in December and January (1969) and made use of the small mammal traps and the Research Centre to study mammal populations.

During 1969 it is hoped to commence a study of the soils, especially in relation to the distribution of the vegetation. The Carnegie United Kingdom Trust has agreed to grant £280 and the Society will contribute a further £75 towards the cost of equipment and expenses. Herbert Sandford, B.A., A.D.E., M.Phil. has been appointed Honorary Scientific Director of the project, and he will be advised by a sub-committee including R. E. Butler, P. A. Moxey and Alan Willmott.

In mid-September 1968 the National Trust acquired a Bush Hog Rotary Cutter and heavy tractor which will be used to keep the paths clear and to control some of the scrub. The use of this cutter was however hampered by an unusually wet summer, the wettest since 1931, the total rainfall for the year being about 30 inches (cf. average rainfall 1916-1950 about 24 inches; in 1967 there were 28 inches). The Common was waterlogged throughout most of the year. On September 15 about four inches of rain fell in 24 hours! In addition more rain water is now draining from nearby roads into the Central ditch, which overflows causing further waterlogging and often pools on Central Path near Bookham Station.

VEGETATION (F. C. Reeves)

Work has continued on the revision of the plant list published in

1954, particular attention being paid to any changes in the distribution of the more common plants.

The vegetation of Crater Pond was studied and notes made of the extent of regeneration since it was cleared by the Conservation Corps in August 1962.

A paper by Miss E. M. Hillman on the number of species of flowering plants in relation to different habitats has been prepared and will be published at a later date.

FUNGI (P. C. Holland)

About 20 years ago, members of the British Mycological Society joined us for a number of visits to the Common, the results of which were summarized, together with records made separately by individual workers between 1941 and 1948, in two reports (Castell 1947, 1949). These lists include some 340 species ranging over most of the main groups of fungi. Thereafter, practically no attention was paid to this important aspect of the Common's natural history until September 1968, when the B.M.S. joined us once more for a foray. Unfortunately, this meeting coincided with the disastrous floods which wreaked havoc over much of the countryside and the collecting was curtailed in consequence. Nevertheless, among the two dozen species recorded were five not included in the previously published lists. A further five additions can be made from the very casual observations made by the writer in the course of his searches for myxomycetes during the past few years. These additions are:

ASCOMYCETES

<i>Daldinia concentrica</i> (Bolton ex Fr.) Ces. & de Not.	iii.66
<i>Stigmatea robertiani</i> (Fr.) Fr. on <i>Geranium robertianum</i> L.	iv.67

HETEROBASIDIOMYCETES—USTILAGINALES

<i>Ustilago avenae</i> (Pers.) Rostrup on <i>Arrhenatherum elatius</i> (L.) J. & C. Presl.	vii.65
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HOMOBASIDIOMYCETES—APHYLLOPHORALES

<i>Piptoporus betulinus</i> (Bull. ex Fr.) Karst.	iii.66
<i>Stereum sulphuratum</i> Berk. & Rav.	ix.68

AGARICALES

<i>Boletus pruinatus</i> Fr. & Hök	ix.68
<i>Collybia peronata</i> (Bolton ex Fr.) Kummer	ix.68
<i>Lactarius tabidus</i> Fr.	ix.68
<i>Pluteus salicinus</i> (Pers. ex Fr.) Kummer	ix.68

GASTEROMYCETES

<i>Phallus impudicus</i> (L.) Pers.	vii.65
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Most of these are common and widespread species. It is likely that many more are only waiting to be noticed. Careful recording over two or three years could reveal interesting changes since the 1940's. However, mere lists of species are of minimal value if they are not supplemented by careful ecological work. In 1947, C. P. Castell pointed out that such work had not yet been attempted and this remains true today. It is to be hoped that some of our members will tackle some of the interesting problems of succession, distribution and habitat requirements which await elucidation.

In conclusion, it is appropriate to mention here an interesting addition to the list of myxomycetes published in last year's report. *Stemonitis virginiensis* Rex was found in Central Wood in July 1965. The species is rather like *S. fusca* Roth, but smaller, paler, the surface net of the sporangia becoming imperfect towards the top and the reticulate pattern on the spores being composed of raised bands instead of minute spines. Described from America in 1891, the species was first found in the British Isles at Woodwick, Orkney in December 1964, subsequently recorded from Berkshire, Perthshire and at Chipstead, Surrey in the Society's own area in June 1965 (Ing, 1967). The Bookham Common specimen thus seems to have been only the fifth British record, although it has since been found in several different parts of the country.

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 ING, B., 1967. Notes on myxomycetes 2. *Trans. Br. mycol. Soc.*, 50, 555-562.

COELENTERATA—HYDROIDS (A. E. Le Gros).

During 1968 two species of *Hydra*, *Chlorohydra viridissima* (Pallas) and *Hydra attenuata* (Pallas) were obtained from Isle of Wight Pond. In previous years I have also found *Hydra oligactis* Pallas. The green hydra is usually plentiful under the leaves of duckweed but its numbers fall sharply towards the end of the year. The brown *Hydra attenuata* was still found in some numbers as late as November 28. R. F. Grayson and D. A. Hayes (1968 *Country-Side*, 20:539-546) in their excellent survey of the British freshwater Hydras give the range of tentacle number in this species as five to nine (generally six) but numbers of the Bookham specimens exceeded this range with ten tentacles.

NEMATODA (J. W. Coles)

Roundworms collected from the Isle of Wight Pond, 1958-1963.

(determined by J. W. Coles, British Museum (Natural History))

Family PLECTIDAE

Plectus cirratus Bastian

Amongst algae, May 1958; in mud, March 12, 1961.

**Plectus palustris* de Man

In mud surrounding reed roots, June 14, 1959.

Plectus parvus Bastian

In mud, August 8, 1963.

Family CAMACOLAIMIDAE

Aphanolaimus sp.

In mud surrounding the roots of *Callitricha* sp., April 13, 1958.

Family MONHYSTERIDAE

**Monhystera paludicola* de Man

In mud surrounding the roots of *Callitricha* sp., April 13, 1958; in mud, March 12, 1961; in mud, August 8, 1963; in mud surrounding reed roots, June 14, 1959.

Family CHROMADORIDAE

**Neochromadora izhorica* (Filipjev)

Amongst algae, May 1958.

Family TRIPYLIDAE

Tripyla sp.*Tobrilus pellucidus* (Bastian)

In mud surrounding reed roots, June 14, 1959.

Roundworms collected from the Lower Eastern pond.

Family DORYLAIMIDAE

Dorylaimus stagnalis Dujardin

In mud, June 9, 1968.

The species marked with an asterisk do not appear to have been reported from Britain before.

Neochromadora izhorica was originally found in slightly brackish water in the Gulf of Finland, but in addition to the above record it has also occurred in a sample, collected by Dr. D. W. Tucker, from a fresh-water spring at 70ft. above Loch Ness at Foyers harbour, Inverness-shire in March 1960.

OLIGOCHAETA (J. W. Coles)

Family NAIDIDAE (Freshwater worms)

(determined by E. G. Easton)

The following five species were collected in mud, Lower Eastern Pond, June 9, 1968:

Chaetogaster diaphanus (Gruithuisen)*Pristina menoni* (Aiyer)*Dero digitata* (Müller)*Ophidona serpentina* (Müller)*Stylaria lacustris* (L.)

Chaetogaster langi Bretscher was collected from Lower Eastern pond May 25, 1968.

CRUSTACEA (G. Beven)

CLADOCERA (Water fleas)

The following four species were collected by J. W. Coles from the Isle of Wight Pond May 25, 1968:

Daphnia longispina O. F. Müller*Simocephalus vetulus* (O. F. M.)*Scapholeberis mucronata* (O. F. M.) *cornuta* form*Eurycerus lamellatus* (O. F. M.)

Daphnia pulex (De Geer) was collected by J. W. Coles from Lower Eastern Pond, June 9, 1968.

(All species determined by W. A. Smith).

A. E. Le Gros contributes the following notes on water fleas:

A water flea *Eurycerus lamellatus* (O. F. Müller) which was not recorded in the short lists published in the *London Naturalist* (1958, 37:58 and 1968, 47:90) was common near the outlet of Isle of Wight Pond on March 10, 1968. All the females examined had from 20-24 eggs in their brood pouches. The commonest Cladocerans throughout the year were found to be the common and widespread species *Simocephalus vetulus* (O. F. Müller) and *Chydorus sphaericus* (O. F. Müller). In November 1967 *S. vetulus* was abundant with the females each carrying 10-16 eggs. Most specimens of *C. sphaericus* were infested with a parasite (?*Cothurnia*).

The densest population noticed during 1968 was of *Daphnia pulex* (De Geer) near the north bank of L. E. Pond on November 28. A

sample check of some thirty females showed that they were still producing "summer", unfertilized eggs though in fewer numbers (8-10 per female instead of about 40). Many of them appeared to be carrying a bundle of debris about with them—this was seen to be mud and plant material that had become tangled up with the often dense growth of epiphytes on the carapace of the waterflea.

OSTRACODA

(determined by W. A. Smith)

The following species were found by J. W. Coles in the Isle of Wight Pond, May 25, 1968:

Herpetocypris sp. (cf. *reptans* (Baird)

Cypridopsis vidua (O. F. M.)

Cyclocypris ovum (Jurine)

COPEPODA—CYCLOPOIDA

(determined by W. A. Smith)

The following species were collected by J. W. Coles from the Isle of Wight Pond, May 25, 1968:

Eucyclops agilis (Koch)

Acanthocyclops viridis (Jurine)

Macrocylops albidus (Jurine)

AMPHIPODA

(determined by R. W. Ingle)

Gammarus pulex (L.) was collected by J. W. Coles from Lower Eastern Pond, June 9, 1968. This species has previously been reported from Isle of Wight ditch (Ellis, A. E., 1948, *Lond. Nat.* 27:60) and *Gammarus* (?) *pulex* (L.) from Isle of Wight Pond and from Upper Eastern Pond in September 1957 (Castell, C. P., 1958, *Lond. Nat.* 37:58). Ellis (loc. cit.) also recorded *Eucrangonyx gracilis* (S. J. Smith) in Isle of Wight Pond and Upper Eastern Pond.

INSECTS—LEPIDOPTERA (C. B. Ashby)

In 1955, A. S. Wheeler published a list of the macrolepidoptera of Bookham Common, giving the known status of 38 species of butterflies and 236 species of moths (*Lond. Nat.* 34:28). Additions to this list have been shown in the Progress Reports for 1965-1967. Including the following six new species for 1968, 28 additions to the moths have been recognized since 1965.

- 107. *Chaonia ruficornis* Hufn. Lunar Marbled Brown.
- 292. *Peridroma porphyrea* Schiff. Pearly Underwing.
- 529. *Cucullia chamomillae* Schiff. Chamomile Shark.
- 576. *Agrochola macilenta* Hubn. Yellow-line Quaker.
- 579. *Anchoscelis helvola* L. Flounced Chestnut.
- 914. *Deuteronomos erosaria* Schiff. September Thorn.

(nomenclature as in Heslop's *Revised Indexed Check List, Ent. Gaz.*: 1959-63).

As a result of continued mercury vapour sampling from the Research hut, records of many species are accumulating and are being filed with a view to eventual publication. From the following comparison it is likely that more new species of moths remain to be discovered at Bookham and there is considerable scope for further enquiry:

Bookham:	264 species
Wimbledon (Dacie, J. V., <i>Ent. Record</i> , 74, 109):	c.300 species
London Area (De Worms, C.G.M., <i>Lond. Nat.</i> , 33-37, 1954-58)	c.722 species
British List (Heslop, <i>Ent. Gaz.</i> : 1963):	c.890 species

The above figures take no account of the so-called micro-moths and no collected work on these has been published for Bookham. Well over a thousand "micros" are listed for Britain, and the survey team would be pleased to hear from any entomologist able to undertake systematic work on these families at Bookham.

INSECTS—HYMENOPTERA. FORMICIDAE (A. E. Le Gros)

From my notebooks of 1947-1948 and 1952-1953, I have extracted the following list of ants seen while searching for spiders. The nomenclature is in accordance with that of C. A. Collingwood (1964 *Trans. Soc. Brit. Ent.* 16:93-121).

Family MYRMICINAE

Myrmecina gramicola Latr. A female was picked up from a path, Bayfield Plain, August 1947.

Myrmica rubra L. Occasionally met with in rides in the woods.

M.ruginodis Nyl. Workers found on yellow composites, Central Plain and a small nest was found in a rotten branch, Central Wood.

M.scabrinodis Nyl. A nest was found in a tree stump in Eastern Wood and individual workers frequently met with when sweeping in the plains.

Stenamma westwoodii Westwood. A small colony found in September 1947 under a stone at the base of an oak, South East Wood.

Leptothorax acervorum Fab. A nest was found in a tree stump in Central Wood in July 1952, and some workers found under bark in Eastern Wood.

Family FORMICINAE

Lasius fuliginosus Latr. Workers were seen in Central Wood but in spite of several searches I was unable to find a nest.

L.flavus Fab. The mounds of this ant are common in the plains. In all of the nests that I opened, I found the blind woodlouse *Platyarthrus hoffmannseggii* Brandt present.

L.niger L. Often met with when sweeping vegetation on the plains.

L.brunneus Latr. On August 10, 1952, P. W. E. Currie drew my attention to workers of this ant running up the trunk of a decayed oak by Hill House path. At that time this ant was considered very rare being known only from Berkshire. Since then it has been recorded from a number of southern and western counties, and although it is mainly a tree-dwelling ant it has occasionally become a pest in houses. I have found three myrmecophiles in the workings of this ant at Bookham—the rare spider *Micaria subopaca* Westring, the fly *Megaselia coaequalis* Schmidt and the millipede *Polyxenus lagurus* L.

Formica fusca L. Workers were seen in Bayfield Plain and by Hundred Pound Bridge.

BIRDS (G. Beven)

Oakwood (Eastern Wood)

The breeding season census was repeated in this 40 acre sample of

dense interior oakwood. The numbers of territories of singing males in the years 1963, 1964, 1965, 1966, 1967 and 1968 respectively were as follows: Starling 5, 5-6, 10, 6, 8, 12, Chaffinch $5\frac{1}{2}$, 7, 8, 7, 6, 4, Nuthatch 2, 5, 5, 5, 7, 5, Great Tit 12, 17, 17, 12, 16, 19, Blue Tit 19, 19, 22, 17, 16, 20, Coal Tit 2, 5, 4, 3, 8, 6, Marsh Tit 3, 1, 1, 3, 3, 3, Longtailed Tit 0, 0, 1, 2, 2, 1, Chiffchaff 2, 5, 7, 6, 6, 3, Willow Warbler $2\frac{1}{2}$, $1\frac{1}{2}$, 4, 4, 2, 6, Garden Warbler 2, 2, 4, 1, 1, 1, Blackcap 5, 3, 4, 7, 6, 3, Mistle Thrush $1\frac{1}{2}$, 2, 3, 2, 1, 1, Song Thrush 4, 7, 7, 8, 10, 7, Blackbird 8, 10, 12, 11, 12, 11, Robin $21\frac{1}{2}$, 32, 37, 37, 42, 43, Dunnock 4, 5, 5, 4, 8, 6 and Wren 1, $5\frac{1}{2}$, 11, 17, 25, 26.

After a fairly mild winter there were further increases in the Robins and Wrens, both reaching the highest figures obtained since the census began about 20 years ago. The Chaffinches are showing a remarkable fluctuation in numbers over the years, increasing from 1946 (6) to a maximum in 1951 ($12\frac{1}{2}$) and then gradually declining to a minimum in 1959(2), then increasing slowly to another peak in 1965 (8) and now decreasing again (4). It is interesting that the Chaffinch population in the scrub and grassland has shown similar fluctuations during this period. The starlings have further increased their numbers in the dense oakwood..

Scrub and Grassland

The Spring census of the number of territories of singing males was again made on 96 acres of scrub and grassland in 1968. W. D. Melluish reports the following numbers of territories on 61 acres (Western, Isle of Wight and Bayfield Plains) during 1963, 1964, 1965, 1966, 1967 and 1968 respectively: Chaffinch 9, 10, 9, 9, 9, 5, Reed Bunting 2, 3, 1, 2, 4, 1, Yellow Hammer 5, 7, 5, 5, 5, 4, Willow Warbler 8, 7, 8, 10, 12, 10, Whitethroat 8, 6, 9, 8, 7, 8, Song Thrush 0, 3, 4, 3, 5, 4, Blackbird 5, 8, 5, 8, 11, 12, Robin 4, 6, 8, 5, 9, 12, Dunnock 7, 5, 7, 6, 10, 7, and Wren 1, 1, 2, 5, 5, 9. A summary of bird census work in this area by W. D. Melluish appears on page 135.

A similar census was repeated on Central Plain, a further 35 acres of scrub and grassland. The number of territories of singing males in 1964 1965, 1966, 1967, and 1968 respectively were as follows: Chaffinch 8, 4, 4, 5, 4. Reed Bunting 0, 1, 3, 1-2, 4. Yellow Hammer 2, 2, 4, 2, 4. Willow Warbler 13, 6, 9, 15, 11. Whitethroat 6, 8, 9, 15, 8. Song Thrush 5, 4, 4, 5, 5. Blackbird 7, 3, 5, 6, 3. Robin 17, 15, 10, 12, 11. Dunnock 6, $7\frac{1}{2}$, 7, $7\frac{1}{2}$, 5; and Wren 1, 1, 4, 5, 6.

Thus over the whole of this 96 acres of mixed scrub and grass the Wren population is still increasing and has made a good recovery from the disaster of the 1962-3 winter. The Chaffinches have decreased since 1967. The number of territories of Green Woodpeckers during the years 1964, 1965, 1966, 1967, and 1968 respectively were 0, 1, 4, 4, 4. This does perhaps suggest that their numbers were reduced during the severe winter of early 1963 although at that time there was insufficient evidence to form an opinion. They seem to have made a good recovery.

During 1968 approximately 2 of these 96 acres were partially cleared of scrub by the National Trust.

A new Spring census was started in 1968 by P. J. Strangeman, of an area of 20 acres including (1) Eastern Plain (about 9 acres) consisting of birch, aspen and willow scrub with scattered trees and stretches of bracken

and *Molinia* grassland on clay covered by sandy gravel downwash (see Castell, C. P. 1958, *Lond. Nat.*, 37, 58-65). (2) An area of about 11 acres comprising a belt of oakwood (Hollow Wood) and the Hollows, which is a shallow valley with three ponds, including the Isle of Wight Pond and small marshy hollows. He estimated the following pairs: Little Grebe 1, Mallard 4, Moorhen 1, Coot 1, Cuckoo 1, Great Spotted Woodpecker 1, Magpie 1, Jay 2, Great Tit 3, Blue Tit 14, Coal Tit 2, Longtailed Tit 1, Nuthatch 1, Treecreeper 2, Wren 9, Mistle Thrush 2, Song Thrush 2, Blackbird 7, Robin 18, Whitethroat 5, Willow Warbler 10, Chiffchaff 5, Dunnock 4, Tree Pipit 1, Starling 4, Bullfinch 1, Chaffinch 3, Yellowhammer 3.

The presence of the Tree Pipit in Eastern Plain is of considerable interest. This species nested probably annually on Eastern Plain at least until 1949, and there were 12 pairs or more present on the whole of the Common in 1948. The numbers gradually decreased, however, and the bird probably ceased to nest after 1954. (A male was present in 1957). Since then no birds have been recorded on the Common until 1968 when a pair took up a territory (ref. 823) and remained there from April 29 to May 30. There was no evidence of nesting. The disappearance of this species from the Common is thought to have been due to the overgrowth of the scrub and bracken on the plains. It is therefore interesting to note that the Tree Pipit this year settled in an area which had been partly burnt in a fire on 28.3.68 and where there had also been a little clearing of scrub and grass cutting in early May 1968. The National Trust intend to clear some birch, aspen and willow scrub and to cut the bracken three times during 1969. It will be interesting to see if this clearing encourages Tree Pipits to nest on Eastern Plain once more.

Other Notes on the Birds

A pair of Little Grebes hatched two broods on the Isle of Wight Pond. A Teal *Anas crecca* seen at the Isle of Wight on March 10 was apparently the first record for the Common during the Survey. There was at least one pair of Kestrels. A Jack Snipe was seen on February 11 (859) (Mary Waller, E. M. Forsyth). Three Woodcock were roding in the spring. A Barn Owl was recorded on June 6 and October 26. At least 9 Tawny Owls were heard hooting; five of these territories were in the 250 acres of woodland (in 1965 there were 4, 1966 4, 1967 3-4). A Hoopoe *Upupa epops* was reported feeding on a garden lawn at the edge of the Common on August 12—another “first” record (Mrs. G. Wales). A Willow Tit was excavating a hole in a rotten stump 8 feet up in Eastern Wood in April, and another was seen carrying food on June 9 (446). The number of pairs of Longtailed Tits in the spring in an area of about 120 acres of grassland and scrub during 1962 was 6, 1963 nil, 1964 3, 1965 4, 1966 4, 1967 6, and 1968 6. There were 4 Nightingales and 5 Grasshopper Warblers singing during the spring. A pair of Wood Warblers nested in Sheepbell Wood (329), 6 young being present in the nest on June 7 (A. G. Channor). This appears to be the first record of nesting of this species during the survey. Hawfinches were noted in June and December. In 96 acres of scrub and grass there were 4 territories of displaying male Redpolls. (Previously up to 1962 there were none, 1963 1, 1964 2, 1965 2, 1966 3-4, 1967 4).

A further note on birds feeding on Plant Galls

Small sample counts were again made during 1968 of the numbers of Marble Galls *Andricus kollari* (Hartig) which had been opened by birds and the larvae extracted. With the help of Miss E. M. Hillman counts were made on January 14, March 10 and May 15 in shrub oak, including only galls up to 7 feet above ground and excluding the very small ones which are not opened by birds. Of a total of 239 galls counted, 138 had been thus opened (58%). The proportion opened by birds in 1968 was larger than in 1967 (then 29%) but these samples are small (see also *Lond. Nat.*, 1967, 46, 114-115). Those marble galls which had been removed by birds such as Woodpeckers could not of course be included in these samples.

Of 8 Globose Galls *Rhabdophaga salicis* (determined by L. Parmenter) found in scrub willow up to 7 feet from the ground on January 14 and March 10, three had been opened by birds and larvae extracted. L. Parmenter reports that on March 9, 1947 he saw Great Tits pecking and opening galls of *Urophora cardui* on thistles.

MAMMALS (G. Beven)

It is hoped that members will enter all their observations on mammals in the record book now being kept in the Research Hut.

Roe Deer were observed on at least 7 occasions during the year and were even watched feeding at midday in Eastern Wood by the bird census team in October. Tracks of deer were noted in I.o.W. Plain (489), Central Wood (53) (543) (55) (56) (58), Eastern Wood (563) (611) (617), Kelseys Wood (275) (279), Stents Wood (238), Greendell Ditch (684).

The Box Hill and Headley Rabbit Clearing Society resumed operations in August. Apparently on the plains most of the rabbits live on the surface in the dense thickets. They are driven out by dogs and then shot. Some "gassing" of rabbit holes is also done. Nevertheless rabbits remain abundant and there was no obvious diminution in numbers after some had been observed suffering from myxomatosis between August and October.

Grey Squirrels were also numerous and as usual fed extensively on fresh oak leaves and flowers during May and also on a prolific hazel nut crop in July. In Eastern Wood a birch tree which in 1961 had been stripped of bark by squirrels down to within 8 feet of the ground fell during August 1968 having rotted down to the base, thus demonstrating how these animals can kill a tree within a few years. In September, fungi of the following species were considered to have been partially nibbled by Grey Squirrels: *Amanita fulva*, *Boletus* sp., *Russula cyanoxantha*, *R. ochroleuca*, *R. xerampelina* and *Tricholoma fulvum* (species determined by P. Holland).

Further notes on the bird population of grassland with encroaching scrub at Bookham Common

By W. D. MELLUISH

THE scrublands of Bookham Common, described on the Ecology Section's base map (Castell, 1943) as Central, Bayfield, Isle of Wight and Western Plains, consist of a roughly rectangular area, 96 acres in extent, being about 1,300 yards long, measured from south-south-east to north-north-west, and having an average width of 340 yards. The floor of the scrublands is thickly carpeted with tussocky grasses, among which *Deschampsia cespitosa* is dominant, and is more or less densely dotted with shrubs, mainly hawthorn, but also rose, bramble and occasional clumps of blackthorn. Among the shrubs are small trees, including many young oaks, and there are extensive tracts of bracken where the ground slopes gently upward to the borders of Central Wood.

Apart from this rising ground the Plains are mostly flat, forming the lower levels of the Common. They are watered by Bookham Stream and its two auxiliary ditches, three or four feet wide in most places, which meet at the south-western corner of the Isle of Wight Enclosure and together flow in a winding course, being joined by similar streams from Bank's Common shortly before leaving the area at Hundred Pound Bridge (map ref. 187), to discharge into the River Mole at Downside. These little water courses give rise to a belt of alluvium along their margins varying in width from 300 to 50 yards, the subsoil of the rest of the scrublands being London Clay (Castell, 1965).

A study of the bird population of the Bayfield, Isle of Wight and Western Plains, covering 61 out of the total 96 acres of scrub, was carried out by members of the Ecology Section during the years 1954 to 1960 and the results published in the *London Naturalist* No. 39 (Melluish, 1960). These showed that the number of species found there had increased by 15% and the counts of individuals had nearly doubled in the six years under review. It was concluded, nevertheless, that some clearance of the scrub was desirable and subsequently, in his paper on the feeding sites of the birds of these plains, Beven (1964) stated that the spread of scrub on formerly grazed common land had become a national problem and that clearance was essential to preserve the habitat. Since the shrubs are highly important as a source of food supply, such clearance should be strictly limited. No doubt a judicious thinning out would be the best policy where practicable.

However, the Conservation Corps of the Council for Nature cleared five acres of Central Plain early in 1960 and later all shrubs have been removed by the National Trust from some ten acres lying to the west of Isle of Wight Ditch (map ref. 84), so that this area is now open grassland with a few small trees left standing. But, apart from the destruction of perhaps a dozen hawthorn bushes where this grassland meets the scrub, no clearance had yet been undertaken by the spring of 1967 on the Bayfield, Isle of Wight and Western Plains, although some general tidying up of the rides and footpaths was being done, from time to time, by the National Trust's resident warden and a few ditches, about a foot in width and one and a half to two feet deep, have been dug in order to drain off surplus

water. Otherwise, except on one or two small patches that were burnt by heath fires accidentally caused, throughout the three Plains the gradual encroachment by the scrub vegetation has continued to take place, tending to reduce the proportion of open grassland available to ground-feeding species.

After a break of two years, during which work on certain aspects of the local bird population was carried out, the monthly counts of all species over these 61 acres were resumed in the spring of 1962 and this paper records the results obtained up to the end of March 1967. For ease of comparison with the 1954/60 figures, summer has again been regarded as the six months April to September and winter from October to March. In Table I the number of species observed during the five-year study are shown and beneath them the corresponding figures of the last five years of the 1954/60 survey, thus providing strictly comparable totals.

TABLE I
The Numbers of Species observed

	1962/3	1963/4	1964/5	1965/6	1966/7	Average of 5 years
For the summer months	...	38	32	41	40	37.8
For the winter months	...	30	25	27	31	28.6
For the year (TOTAL—1962/67—66 spp.)	...	45	38	47	48	44.8
<i>Previous Survey</i>	1955/6	1956/7	1957/8	1958/9	1959/60	
For the summer months	...	35	40	43	43	42.0
For the winter months	...	33	30	33	38	33.8
For the year (TOTAL—1955/60—71 spp.)	...	49	43	56	49	50.6

It will be seen that the number of species recorded has declined, in comparison with those of the earlier survey, by 10% in summer, by 15.4% in winter, and when the years are considered, by 11.5%. These figures include residents, summer and winter visitors, passage migrants and vagrants, however, and when the complete picture is looked at, the number of species observed in all during the five-year study has fallen in comparison with that of the entire 1954/60 survey by 8.3%, the totals being 66 and 72 respectively. If, on the other hand, in order to compare periods of equal duration, the five years 1955/6 to 1959/60—as given in the table above—are considered, the relevant numbers of species were 66 and 71 and the reduction was 7.04% only.

The decline was partly due to the smaller number of occasional, or vagrant, species (those recorded three times or less in either survey) that have visited the plains, namely 16 compared with 20, and Table II lists 12 for 1954/60 which were absent in the 1962/67 period and seven seen in the latter but not in the former survey.

TABLE II

Species observed in 1954/60 <i>but not in 1962/67</i>	Species observed in 1962/67 <i>but not in 1954/60</i>
Heron	Kingfisher
Hobby	Sedge Warbler
Partridge	Spotted Flycatcher
Water Rail	Great Grey Shrike
Snipe	Red-backed Shrike
Jack Snipe	Siskin
Short-eared Owl	Crossbill
Rook	
Jackdaw	
Whinchat	
Tree Pipit	

The Tree Pipit no longer breeds in the area, but of the species that have been gained, Spotted Flycatcher nested in 1966 and Red-backed Shrike in 1963 and 1964.

Special mention must be made of Woodcock, Barn Owl and Tawny Owl. These were not registered on any of the monthly counts, but Dr. G. Beven, from nocturnal observations, has recorded both owls and considers that one pair of each is usually resident on the Plains. Woodcock have been seen in roding flight across the survey area on a number of occasions and the three species are included in the totals given in Table I.

The absence of Snipe and Jack Snipe from the Isle of Wight Plain in recent times may perhaps be due to the draining of a marshy pool situated about 130 yards to the south-west of Manor Cottage, and having a base map reference of 7323. This was effected by means of a small channel connecting the pool to Bookham Stream, dug in the early spring of 1962, which apparently prevented the formation of the muddy condition of this part of the plain that had formerly attracted these two waders. There have been no records of either since February 11 of that year, when a single Jack Snipe was flushed from rushes at this spot.

Thirty-six species bred in the survey area during the five years under review. Also there were almost certainly single territories of Barn Owl and Tawny Owl, but exact breeding data are not available for these two species for inclusion in the following Table III, which shows the number of territories held by singing males, residents and summer visitors being separately grouped therein. In the 1954/60 study, breeding territories were only assessed in the case of nine selected forms. With the exception of the Tree Pipit these may perhaps be regarded as being characteristic of the scrub habitat and the results obtained have, therefore, been shown in the table for comparison with those of the current work.

In addition, the two left-hand columns contain the figures for 10 species recorded by P. W. E. Currie in his survey of 1948/49 (Currie, 1950), carried out at a time when grazing by cattle still occurred on the plains and of special interest because of the habitat factor. Currie covered a somewhat larger area than that of the surveys of 1954/56 and 1962/67, including Bank's Common and the Isle of Wight enclosure within his boundaries, so that comparison cannot be exact.

TABLE III
The Numbers of Territories of Singing Males

P. W. E. Currie

	1948	1949	1954	1955	1956	1957	1958	1959	1962	1963	1964	1965	1966
RESIDENT SPECIES													
Mallard									—	1	1	—	—
Pheasant									2	0	2	1	2
Moorhen									0	0	0	—	1
Wood Pigeon									1	1	1	1	2
Green Woodpecker									—	0	0	0	3
Magpie									2	0	1	1	2
Jay									2	0	0	0	0
Great Tit									2	3	2	2	6
Blue Tit									6	6	6	6	6
Marsh Tit									0	—	0	0	1
Willow Tit									1	—	1	1	0
Longtailed Tit									1	1	2	2	3
Nuthatch									0	0	—	0	1
Wren			5	4	1	3	3	3	5	1	1	2	5
Mistle Thrush									0	1	0	0	0
Song Thrush									2	0	3	4	3
Blackbird		6 to 9							8	5	8	5	8
Robin		6	3	1	4	4	4	3	9	4	6	8	5
Dunnock	5	10	3	4	2	3	4	5	8	7	5	7	6
Linnet									1	1	1	3	2
Lesser Redpoll									0	1	1	2	2
Bullfinch									3	1	4	4	5
Chaffinch	18	33	12	9	10	6	9	8	12	9	10	9	9
Yellowhammer	9	5	4	4	5	3	4½	3½	1	5	7	5	5
Reed Bunting	2	2	1	2	2	4	3	4	5	2	3	1	2
SUMMER VISITORS													
Turtle dove			1 or 2							2	2	5	3
Nightingale										2	1	0	1
Grasshopper Warbler	3	5							0	2	1	1	4
Blackcap									0	1	0	0	1
Garden Warbler									2	—	2	1	0
Whitethroat	14	27	8	7	9	8½	8½	12	12	8	6	9	8
Lesser Whitethroat									0	1	0	2	2
Willow Warbler	10	21	7	7	8	16	11	13	11	8	7	8	10
Chiffchaff									—	0	1	1	3
Tree Pipit	11	8	1	0	0	1	—	—	—	—	—	—	—
Spotted Flycatcher									0	—	0	0	1
Red-backed Shrike	1 or 2								—	1	1	0	—
										Resident Species	71	49	65
										Summer Visitors	29	24	23
										Number of Territories	100	73	88
										Number of Species	23	24	25
										(probably plus one Barn Owl and one Tawny Owl in most seasons)	25	25	30
										Legend:	Birds not observed		
										Birds seen but no territories formed	—	0	
										Territories not assessed	no entry		

The major climatic feature occurring during the period was the prolonged, and quite severe, cold spell in the early months of 1963, when the ground remained frozen from the turn of the year until the end of February. The effect of this cold weather is reflected in the numbers of breeding territories occupied. With a few exceptions the trend was downwards and those of the resident species fell from 71 in 1962 to 49 in 1963 and those of the summer visitors from 29 to 24. The decline would, of course, be expected in the case of the residents, but why were the summer visitors,

arriving in the warmer weather, similarly affected? It may be that there was less available insect food than is usual in most springs and some species may have suffered on migration. Following this severe weather the normal seasonal changes prevailed, the final winter of the series, that of 1966/67, being unusually mild. Of the 60 counts, 40 took place in dry weather: there was some rain on seven occasions, drizzle at times on 11 and only in January and February of 1963 was there snow on the ground.

After the drop from 100 in 1962 to 73 in 1963, with milder winters supervening, the number of territories gradually increased until in the last year of the survey 112 were recorded, the number of species having risen in the same time from 23 to 30. Dominant among those breeding on the plains are Whitethroat, Willow Warbler and Chaffinch. Whitethroats appear to be almost holding their own in recent years, with an average of 8.6 territories for 1952/66 in comparison with 8.8 for 1954/59, but these numbers are much less than the 14 and 27 territories of the 1948/49 survey, which, however, covered an acreage greater by 6.5% than that of both subsequent studies. The Willow Warbler pattern is rather variable. Numbers are low for a year or two after cold winters, e.g. 10 two seasons after the cold winter of 1947 and again 7 and 8 after cold winters in 1955 and '56, then increasing with milder weather, but dropping again to 8 in 1963 and finally rising to 10 in 1966. The 1949 count of 21 territories has not been equalled, although fairly nearly approached by the 1957 total of 16. But, on the whole, the species does not seem to be declining to any great extent on the three plains.

Nine or 10 pairs of Chaffinches nested each season from 1963 to 1966, which is slightly more than the average of exactly 9 over the six years 1954/59. But these figures show a very steep decline from the 1948/49 counts of 18 and 33, when the scrub growth would have been much less and the coarse grasses kept in check by grazing. The Robin has increased considerably in spite of the general spread of the scrubland vegetation and it may be that the clearance work done in recent years had already benefitted this species, more grass-covered ground suitable for feeding having been opened up. Thirty-two Robin breeding territories have been recorded during the five seasons of 1962/66, compared with only 21 in the six years of the earlier study.

Dunnocks also have increased, with territory numbers almost the same as those of the Robin, showing an average of $6\frac{1}{2}$ against the $3\frac{1}{2}$ of 1954/59. The Wren was reduced to single territories in 1963 and 1964, as a result of the cold spell, but recovered in the next year and in 1966 no less than five were registered, which compares very favourably with the 3.2 average for 1954/59.

The area supports 5 to 8 pairs of Blackbirds in recent years, which is much the same in strength as the 6 to 9 of the 1948/49 counts. Unfortunately no comparable assessments for this species were made in the 1954/59 survey, but it is clear that its status has been well maintained. The Turtle Dove has increased a little over the one or two pairs of 1948 and 1949 and Reed Buntings, which are associated with the alluvial belt along the banks of Bookham Stream, have set up two or three territories in most summers, during this and the previous surveys. Strangely, the records show only one pair of breeding Yellowhammers in 1962, although there were five in the spring of 1963 immediately after the very cold beginning of that year. As this is usually a fairly conspicuous species, particularly in high summer, the paucity of registrations for 1962 may have been

due to some special reason. It is apparent, however, from later results that the three plains support about five pairs each breeding season, thus indicating a slight increase over the average of four for 1954/59. The number of territories of Grasshopper Warblers varies considerably from year to year. Currie found three in 1948 and five in 1949. It is worthy of comment that in spite of the great increase in the growth of scrub during the intervening years there could still be four pairs nesting in 1966. The Tree Pipit has been lost, not having been observed on the plains since 1954 and the few records of the Cuckoo are insufficient to justify the assessment of a territory within the area in recent summers, although its beautiful call notes could now and then be heard from the surrounding wooded country. On the other hand, the Lesser Redpoll has become a regular breeder and the trilling display flights of this delightful little finch have become a most enjoyable feature of the summer counts.

Species recorded as breeding in 1962/66 but not in 1954/59 are Mallard, Green Woodpecker, Marsh Tit, Willow Tit, Blackcap, Garden Warbler, Spotted Flycatcher and Red-backed Shrike. In addition, Great Tit and Blue Tit, previously regarded as being resident nearby, as they nest in the adjoining woodlands, are now seen to set up territories within the census area, perhaps because some of the shrubs have grown large enough to afford them nesting sites.

The numbers of all birds observed in the survey area are shown in Table IV, those flying over at a height, such as gulls, being excluded. Because of limitations of space the figures recorded on the 60 counts have been aggregated, as in the 1960 report, into summer and winter totals, each representing six, monthly, censuses. The counting was usually done within the hours of 11.00 and 13.30, at about the middle of each month. For the purposes of comparison the corresponding totals for 1955/56 to 1959/60, the last five years of the previous survey are also quoted.

Occurrences at times other than those of the monthly counts, although used in assessing breeding territories, have not been included in the above table. Results must depend to a considerable extent on the vagaries of the weather, local movements, the conspicuousness of particular species at the time of observation and other factors and it must be emphasised that, where migrants are concerned, birds may pass through the plains on passage, staying perhaps only for a day or two at the beginning or end of a month and thus be missed from a census taken on, say the 14th.

For example, Redwings and Fieldfares visit the plains each winter to feed on the berry harvest. They are often in flocks of 200/300, but accurate counting is out of the question as a rule owing to the great activity of these attractive thrushes. Most of the birds leave when the bulk of the haws have been consumed and the length of their stay, therefore, depends on the abundance of the supply of berries provided by the scrub bushes. However, such circumstances applied also to the previous survey and the chance factor is unlikely to affect resident species to the same extent, so that it seems reasonable take to the figures as they stand, for comparison.

The totals for 1963/64 were low, following the severe weather of the preceding winter, but there was a revival during the following summer and this was maintained at a fairly constant level in subsequent counts.

Compared with the 1955/60 figures, summer numbers of the current survey were slightly higher, but there was a greater reduction in winter resulting in a decline in the total number of birds counted of 7.1%. As

TABLE IV

TABLE IV: *Numbers of Birds Observed/Totals of Summer and Winter Counts*

	1962/3		1963/4		1964/5		1965/6		1966/7	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Mallard	—	—	—	—	15	—	—	—	—	2
Kestrel	2	—	—	—	2	1	1	—	—	—
Pheasant	7	2	3	1	3	2	2	—	4	2
Moorhen	1	—	1	—	1	—	—	—	3	1
Stock Dove	—	—	—	1	—	—	—	—	—	—
Wood Pigeon	4	14	9	1	6	62	6	8	10	1
Turtle Dove	6	—	10	—	15	—	11	—	8	—
Cuckoo	—	—	—	—	3	—	2	—	—	—
Swift	11	—	8	—	6	—	3	—	—	—
Kingfisher	—	—	—	—	—	—	—	1	—	—
Green Woodpecker	—	—	1	—	3	1	2	3	7	2
Great Spotted Woodpecker	—	—	—	—	—	—	—	—	2	—
Lesser Spotted Woodpecker	—	1	—	—	—	—	1	—	—	—
Skylark	—	—	—	—	—	—	—	3	—	5
Swallow	5	—	4	5	11	—	8	—	3	—
House Martin	2	—	4	—	6	6	4	—	—	—
Carrion Crow	—	—	—	—	—	—	1	—	—	—
Magpie	7	8	6	6	2	5	6	14	9	15
Jay	5	23	7	12	2	6	11	13	6	18
Great Tit	9	8	9	15	14	14	16	18	21	20
Blue Tit	32	26	40	41	40	28	30	35	51	51
Coal Tit	1	1	—	—	—	—	—	—	—	—
Marsh Tit	1	4	—	4	2	2	1	5	2	1
Willow Tit	5	2	—	—	4	4	2	5	6	6
Longtailed Tit	6	—	—	2	—	8	1	3	6	33
Nuthatch	—	—	—	—	—	—	2	3	1	1
Wren	16	3	6	1	4	2	9	14	17	22
Mistlethrush	—	1	—	5	1	1	2	1	2	6
Fieldfare	—	48	—	3	—	5	—	3	—	37
Songthrush	5	8	4	4	17	9	10	5	10	9
Redwing	—	197	—	6	—	2	—	1	—	1
Blackbird	34	52	24	47	42	77	33	65	43	85
Nightingale	2	—	1	—	4	—	—	—	1	—
Robin	30	23	23	61	40	40	39	45	27	54
Grasshopper Warbler	1	—	3	—	1	—	1	—	8	—
Sedge Warbler	—	—	—	—	—	—	1	—	—	—
Blackcap	1	—	2	—	2	—	3	—	4	—
Garden Warbler	2	—	—	—	6	—	3	—	4	—
Whitethroat	46	—	30	—	23	—	34	—	28	—
Lesser Whitethroat	3	—	4	—	2	—	6	—	5	—
Willow Warbler	32	—	35	—	32	—	37	—	31	—
Chiffchaff	—	—	5	—	8	—	5	—	9	—
Goldcrest	—	1	—	—	—	1	—	2	—	—
Spotted Flycatcher	2	—	—	—	1	—	1	—	—	—
Dunnock	26	28	34	35	37	26	33	46	23	35
Meadow Pipit	—	—	—	—	—	—	1	—	—	—
Pied Wagtail	—	—	—	—	2	3	—	1	—	1
Grey Wagtail	—	—	—	—	—	—	—	1	—	2
Great Grey Shrike	—	—	—	—	—	—	—	—	—	1
Redbacked Shrike	—	—	—	—	2	—	—	—	—	—
Starling	6	8	4	4	2	12	7	10	—	3
Hawfinch	1	—	—	—	—	—	—	—	—	—
Greenfinch	—	2	2	3	3	5	1	1	2	5
Goldfinch	11	3	7	—	17	—	32	18	1	3
Siskin	—	—	—	—	—	—	—	—	1	—
Linnet	7	1	7	—	7	—	18	1	4	—
Lesser Redpoll	1	53	1	1	6	5	12	—	5	3
Bullfinch	10	6	8	18	18	23	23	22	29	17
Crossbill	—	—	—	—	—	—	—	—	2	—
Chaffinch	49	20	47	29	50	34	35	41	16	11
Yellowhammer	3	2	22	1	16	1	20	2	16	2
Reed Bunting	14	3	3	—	12	2	4	—	7	4
House Sparrow	11	—	4	11	—	—	—	—	—	3
Summer	417	378	490	478	433					
Winter	548	317	389	391	463					
TOTALS	1962/7		Previous Survey							
Summer	2,196		1955/60							
Winter	2,108		2,143							
GRAND TOTALS	4,304		2,490							
	4,633		4,633							

already shown, there was a fall in the number of species observed, during the same series of years, amounting to 7.04 %, almost the same degree and, as clearance of the scrub continues to be carried out by The National Trust from time to time, subsequent counts should indicate whether this decline, both in numbers and variety, is a temporary one or whether a definite falling trend is occurring.

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A Preliminary List of Sawflies of Bookham Common.

By P. W. E. CURRIE

THE following notes are the result of regular, but not very systematic, collecting at Bookham Common during the years 1946-1955. During the later years of this period my visits were less frequent, and there are relatively few records after 1952.

Sawflies are a group of somewhat primitive Hymenoptera, characterised by the possession of phytophagous larvae, many of which are superficially similar to those of the Lepidoptera. There are something under 500 recorded British species, more than half of which are associated with woody plants, especially *Salicaceae*, *Betulaceae*, *Rosaceae* and *Coniferae*. Substantial numbers are also attached to *Gramineae* and *Juncaceae* and to ferns. At most stages of their life they are highly sensitive to variations in temperature and humidity and in the immature stages (egg, larva and pupa) a relative humidity of 100 % is required (Benson, 1950). Many species, especially perhaps those with gregarious larvae, show large and rapid variations in abundance. I have referred briefly, in the list, to the larval foodplant, where known.

Bookham Common provides a fair range of habitats suitable for sawflies. In particular the ponds and hollows, streams and ditches are rich in species associated with *Juncus*, *Equisetum*, *Salix* and other plants characteristic of damp areas. The birch trees of Eastern Plain and of the woodland paths and fringes are also rich in species; but the stands of aspen (*Populus tremula*) on Eastern Plain prove curiously unproductive. There are many species associated with *Quercus*, but these are naturally not so easy to collect since many of them must spend much of their time out of reach of the ground. On the other hand the many species associated with *Coniferae* and *Alnus* are naturally absent.

The list of species undoubtedly reflects certain elements of bias in my collecting. Most sawflies are fairly inconspicuous and sluggish, rarely seen on the wing, and most easily collected by sweeping with a kite-net or beating into a collecting tray. Most of my collecting was done by the former method, and it is obvious that that method is easier to apply to certain types of terrain and vegetation than to others. Such plants as hawthorn and oak do not lend themselves to sweeping. There is therefore in my list a preponderance of species associated with grasses and low growing herbaceous plants, and with the easily-worked bushes and trees of sallow, birch and poplar. In addition the conspicuous and easily collected species of *Tenthredo* and *Macrophya* are well represented. Many species are more conspicuous and more easily found as larvae than as adults and I do not doubt that a quite different and probably longer list could be assembled by anyone who has—as I had not—the time and skill systematically to collect larvae and breed them out.

Unfortunately I made few records of galls or leaf mines. I have, however, included in my lists the undated records of Burkhill (1946) and Niblett (1941).

I do not at present have access to the *Proceedings* of the South London Entomological and Natural History Society. The notes from field meeting reports summarised by Groves (1968) mention two sawflies as taken at Bookham, both of which are recorded in my list: *Abia (Zaraea) lonicerae* and *Tenthredo temula (celtica)*.

I am greatly indebted to the late Mr. R. B. Benson for much help and encouragement and for confirmation of the identification of a number of species as indicated in the list; and to the late Mr. L. Parmenter, who first suggested that I should study sawflies and who presented me with specimens of several species that would not otherwise figure in this list.

The nomenclature in this paper is that used by Mr. R. B. Benson in his synopsis of the *Hymenoptera Symphyta: Handbooks for the Identification of British Insects, Vol. VI, Part 2, 1951-8*.

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PAMPHILIIDAE: PAMPHILIINAE

Larvae in webs or leaf rolls on deciduous trees or shrubs.
Neurotoma mandibularis (Zaddach). ♂ swept from birch, 11.v.47, det. R. B. Benson.

Pamphilius pallipes (Zett.). 2 ♀♀ on *Betula* sp. 25.iv.48.

CEPHIDAE: CEPHINAE

Larvae bore in stems of *Gramineae* or *Rosaceae*, and are sometimes serious pests of cultivated cereals.

Hartigia nigra (Harris). ♂ I.o.W. pond 10.vi.51. Larvae found not uncommonly in stems of *Rubus fruticetorum* agg. in woodland paths and clearings.

H. xanthostoma Eversmann. 3 ♀♀ bred v.52 from larvae in stems of *Filipendula ulmaria* (L.), Central Plain.

H. linearis (Schrink). ♂ 3 ♀♀ bred vi.46 from larvae in stems of *Agromonia eupatoria* L. Not uncommon May/July on Central Plain, often at flowers of *Crataegus*.

Janus femoratus Curtis. ♂ 17.v.48 from oak at edge of Central Wood. ♂ 11.vi.50 E. Plain. The larva bores in young twigs of oak.

Cephus pygmaeus (L.). 3 ♂♂ 9.vi, 23.vi.46.

C. cultratus Eversmann. Several swept from grass in June most years.

Calameuta pallipes (Klug). Several swept from grass vi/vii.49-52.

ARGIDAE

Sluggish, heavily built insects, often frequenting flowers. Larvae on *Rosaceae*, *Salicaceae* and *Betulaceae*.

Sterictiphora geminata (Gmelin). ♀ 29.v.49 E. Hollow on *Rosa*, the food plant of its larva.

Arge ochropus (Gmelin). ♀ 14.viii.49 on flower of *Pastinaca sativa* L.

A. pagana stephensii (Leach). Larvae and adults often abundant on *Rosa* spp. in woodlands and clearings.

A. cyanocrocea (Förster). ♀ 15.vi.38 per L. Parmenter. ♀ 11.vi.50 Central Plain.

A. nigripes (Retzius). ♀♀ 24.iv, 24.v.47, 29.v.49, 11.vi.50.

A. ustulata (L.). 10 ♀♀ bred from larvae on *Salix* vi/vii.51. Sometimes abundant at *Crataegus* flowers, and the larvae often abundant on *Betula* cf. *pubescens* and *Salix*.

CIMBICIDAE

This family includes some of the largest British sawflies, with large, conspicuous larvae.

Zaraea lonicerae (L.). ♂♂ 6.vi.46 I.o.W. pond, 30.iv.50 E. Plain; ♀ 29.iv.49 W. Plain. Larvae feed on *Lonicera*, etc.

Abia sericea L. ♀ bred vi.48 from larva on *Succisa pratensis* Monch. coll. 26.vii.47, per W. H. Spreadbury.

Cimbex femorata (L.). ♀ 12.v.46. Larvae sometimes abundant on *Betula* spp.

Trichiosoma tibiale Stephens. ♂ 25.iv.47 from cocoon on *Crataegus*, the food plant of the larva.

T. lucorum (L.). ♂ v.47, from larva on *Betula*; ♀ 3.v.52, from larva on *Salix*.

DIPRIONIDAE

This family, being associated exclusively with *Coniferae*, is not represented on the Common.

TENTHREDINIDAE

The predominant family in Britain, comprising five-sixths of the total species.

Stromboceros delicatulus (Fallén). 2♂♂ 24.v, 8.vi.47; ♀ 10.vi.51. Larvae on various ferns.

Strongylogaster lineata (Christ). Abundant on bracken, especially in and at the fringes of woods.

S. xanthoceros (Stephens). ♀ Upper Eastern Pond 29.v.49.

Aneugmenus padi (L.). Abundant on bracken.

Melisandra cinereipes (F.). Larva on *Myosotis*. Fairly common along ponds and ditches.

M. morio (F.). Six specimens, June/Aug., in similar habitats to the preceding.

Selandria serva (F.). Larvae on *Gramineae*, *Juncus* etc. Often very abundant in hollows and by ponds, May/Aug.

Loderus vestigialis (Klug). *Equisetum*. ♂ 4 ♀♀ at various dates May/June.

Dolerus pratensis (L.). *Equisetum*. ♂ I.o.W. pond 12.v.47; ♀ S.E. pond 2.v.48.

D. aericeps C. G. Thomson. *Equisetum*. Abundant at I.o.W. and Lower Eastern Ponds, June/Aug.

D. cothurnatus Lep. *Equisetum*. Abundant round ponds, April/June.

D. madidus (Klug). *Juncus*. Not uncommon, from widely scattered localities.

D. triplicatus (Klug). *Juncus*. ♂ 12.v.46.

D. ferrugatus Lep. *Juncus*. 3♂♂ 1♀ March/June, by ponds.

D. liogaster C. G. Thomson (incl. *brevitarsus* Hartig). This and the remaining species of the genus had larvae on *Gramineae*. Common and widely distributed in woods and hollows, May/June.

D. puncticollis C. G. Thomson. ♂ 16.iv.49, ♀ 30.iv.49.

D. gonager Fabricius. ♀♀ 22.v.49, 6.v.51.

D. haematodes Schrank. 4♂♂ 2♀♀ May/June.

D. asper Zaddach. 8♂♂ April/May, along streams and hollows.

D. nitens Zaddach. One of the earliest sawflies to appear. 2 ♀♀ 27/28.iii.48, det. R. B. Benson. 2♂♂ 2♀♀, March/April.

D. possilensis Cameron. ♀ 7.viii.48 per L. Parmenter; 2 ♀♀ 17.iv.49.

D. niger L. 2♂♂ 2.vi.46.

D. aeneus Hartig. Not uncommon, widespread, April/May.

D. sanguinicollis Klug. 2♂♂ 29.v.49, 3.vi.50, by ponds.

D. picipes Klug. Abundant and widespread, April/June.

D. nigratus Müller. Common and widespread, April/June.

Athalia bicolor Lep. ♀ 29.v.49, E. Hollow.

A. glabricollis Thomson. *Cruciferae*. ♀♀ 20.vii.47, 13.viii.50.

A. rosae (L.). 2♂♂ 5.viii.50, at flowers of *Angelica sylvestris* L., Bayfield Plain. This species was formerly a pest of turnips etc., in cultivation.

A. lugens Klug. *Cruciferae*. Sometimes abundant in damp places, May/Aug.

A. cordata Lep. Abundant and ubiquitous.

A. lineolata Lep. Sometimes abundant at flowers of various *Umbelliferae*, Aug./Sept.

A. liberta (Klug). ♂ 27.viii.38 per H. J. Burkill; 2 ♀♀ 9.vi.46, 28.viii.49.

Empria candidata (Fallén). ♂ 12.v.47, 2 ♀♀ 24.iv.49, 30.iv.50, swept from birch, the food plant of the larvae.

E. pumila (Konow). ♀ 22.v.49, I.o.W. ditch.

E. baltica Conde. ♀ 22.v.49, W. Plain by stream. This and the preceding species are associated with *Filipendula ulmaria* (L.).

E. excisa (Thomson). 2 ♀♀ 9/23.vi.46.

E. liturata (Gmelin). *Fragaria* and *Geum*. ♀♀ 18.iv.48 by I.o.W. pond, 1.v.49 Upper Eastern Pond.

E. longicornis (Thomson). *Rubus idaeus* L. 2 ♂♂ 24.v.47, 24.iv.49.

E. tridens (Konow). *Geum*, *Rubus* etc. 2 ♂♂ 24.v.47, 25.iv.48 in woods; ♀ 6.v.51.

E. alector Benson. ♀ 14.v.50, Stents Wood.

Ametastegia equiseti (Fallén). *Chenopodium*, *Polygonum* etc. 2 ♂♂ 12.v.46, 29.v.49 I.o.W. pond.

A. glabrata (Fallén). 3 ♂♂, 1 ♀ May/June 1946/7 in damp areas. The larvae feed on various herbaceous plants, and pass the winter resting stage in hollow stems etc., frequently boring into apples.

A. albipes (C. G. Thomson). Associated with *Populus tremula* L. ♂ 10.vi.51 Greendell Ditch, ♀ 10.vi.51 I.o.W. pond.

A. pallipes (Spinola). *Viola* spp., on which it is sometimes a pest. ♂ 15.iv.49 Central Wood, ♀♀ 12.v.47 E. Wood, 10.vi.51.

A. tener (Fallén). *Rumex*. ♂ 2.vi.46, 3 ♂♂ 10.vi.51, ♀ 25.iv.48, I.o.W. Plain.

Allantus togatus Panzer. *Quercus* etc. ♀ 11.vii.54, I.o.W. pond.

A. calceatus (Klug). Common along streams and ditches. 3 ♂♂ 4 ♀♀ bred v.47 from larvae on *Filipendula ulmaria* (L.) coll. ix.46.

A. cinctus (L.). *Rosa* etc. 6 ♀♀ May/Aug. round ponds.

A. cingulatus (L.). *Rosa* etc. ♀ 9.vi.46.

Apethymus braccatus (Gmelin). *Quercus*. This and the following differ from all other British sawflies in that the adults appear in autumn and the eggs overwinter before hatching. The larvae are often conspicuous in spring, descending the trunks of oaks. ♀ 3.x.48; ♀ bred 13.x.46 from larvae on oak.

A. abdominalis (Lep.). ♀ bred x.46; ♀ 12.x.47 L.E. pond, per L. Parmenter.

Endelomyia aethiops (F.). Larva skeletonises leaves of *Rosa* spp. ♀ 2.vi.46.

Caliroa cerasi (L.). Larvae occasional on *Crataegus*. The larvae are the well-known blackish slugworms of cultivated pear and cherry.

C. annulipes (Klug). 2 ♀♀ bred 16.v.48 from larvae on *Salix* coll. x.47. 2 ♀♀ 11.vii.54.

C. varipes (Klug). ♀ 29.vi.47 on *Populus tremula* L., E. Plain. Larvae on *Salix* cf. *aurita* 14.ix.47. Larvae widespread on *Salix* spp. 3.x.48.

Eutomostethus ephippium (Panz.). *Poa* etc. Common in damp areas May/July.

E. luteiventris (Klug). *Juncus effusus* L., in which the larva feeds internally until its last instar, when it emerges to feed externally. Abundant in damp areas May/July.

E. gagathinus (Klug). 2 ♂♂ 9.vi.46, 29.vi.47 by ponds.

Stethomostus fuliginosus (Schrank). *Ranunculus sceleratus* L. 3 ♂♂ 2 ♀♀ July/Aug., in damp areas.

Phymatocera aterrima (Klug). *Polygonatum* spp., especially *multiflorum* (L.) (Solomon's seal). ♀ 9.v.48 Central Wood, per L. Parmenter.

Rhadinoceraea micans (Klug). Larvae and adults numerous every year on one small clump of *Iris pseudacorus* L. by Upper Eastern Pond.

Periclista albida (Klug). The spiny larvae of this genus feed on *Quercus* in the spring. Common at oak buds April/May.

P. lineolata (Klug). ♂ 3 ♀♀ April/May at oak buds.

P. pubescens (Zaddach). ♀ 25.v.41 per L. Parmenter, det. R. B. Benson.

Ardis brunniventris (Hartig). ♀ 5.v.46. The wilted tips of rose shoots, attributable mainly to the boring larvae of this species, were often common.

Blennocampa pusilla (Klug). ♂ 3 ♀♀ May/June. The rolled leaf-edges of *Rosa* spp. caused by the larvae of this species were usually abundant.

Monophadnoides puncticeps (Konow). *Poterium sanguisorba* (L.). Abundant April/May in open areas.

Halidamia affinis (Fallén). *Galium* spp. ♀ 9.vi.46.

Scolioneura betuleti (Klug). ♀♀ April /May. Leaf mines in birch leaves often abundant.

Messa nana (Klug). Leaf mines of *Betula*. ♀ 12.v.46.

Fenusia pusilla (Lep.). ♀ bred 7.vi.51 from leaf mine on *Betula*.

Fenella nigrita Westwood. Mines in leaves of *Agrimonia eupatoria* L. Central Plain, 11.vii.54.

Aglaostigma aucupariae (Klug). *Galium* spp. Common April/May on undergrowth at wood edges.

A. fulvipes (Scopoli). Common May/June in similar habitats.

Tenthredopsis nassata (L.). *Gramineae*. Very common and ubiquitous.

T. litterata (Geoffroy). ♀ 20.vi.48.

Rhogogaster dryas (Benson). 2 ♀♀ 29.vi.47, ♂ 11.vi.50, from *Populus tremula* L., its food plant, on E. Plain.

R. viridis (L.). Abundant, paths and rides.

Tenthredo maculata Geoffroy. *Gramineae*. 2 ♀♀, 9.vi, 16.vi.46. Single specimens seen in most years in damp, shady areas.

T. celtica Benson. Abundant May/June at *Crataegus* flowers etc.

T. atra L. Polyphagous. Fairly frequent May/June at fringes of woods.

T. livida L. Polyphagous. Abundant round ponds and woods.

T. ferruginea Schrank. Polyphagous. ♀♀ 26.vi.46, 10.vi.51, Central Wood.

T. colon Klug. Polyphagous. 2 ♂♂ 24.v.47.

T. mesomelas L. Polyphagous. Abundant in long grass in marshy places and open rides.

T. scrophulariae L. 4 ♂♂ bred vi.47 from larvae on *Scrophularia* along streams. ♀♀ 20.vii, 10.viii.47.

T. marginella Fabr. Frequent round ponds and at flowers of *Umbelliferae*. ♀♀ bred vi.47 from abundant larvae on *Mentha*, I.o.W. pond.

T. arcuata Forster. *Trifolium*. ♀♀ 13.vii.47, 17.v, 15.vi.48.

T. acerrima Benson. *Lotus corniculatus* L. Not uncommon July/Aug., at flowers of *Umbelliferae*.

T. schaefferi Klug. *Trifolium* etc. Common at flowers of *Umbelliferae*, July/Aug. ♀ bred vi.47 from larva on *Mentha*, I.o.W. pond.

Pachyprotasis rapae (L.). Polyphagous. ♂ 9.vi.46, ♀♀ 2.vi.46, 24.v.47.

Macrophyia ribis (Schrank). *Sambucus*. ♀ 4.vi.49, Hill Wood.

M. duodecim-punctata (L.), *Carex*, *Gramineae* etc. Numerous round ponds and hollows June 1946, but only one specimen in any other year.

M. annulata (Geoffroy). *Potentilla*. Common and sometimes abundant on *Rubus* etc. at edges of woods.

Cladius pectinicornis (L.). *Rosa* etc. Six specimens, April/May and Aug., mostly in woodland.

C. difformis (Panz.). *Rosa* etc. Eight specimens, similarly distributed.

Priophorus brullei Dahlbom. *Rubus*. 3 ♂♂ 11.viii.46, 24.v.47, 22.v.49; ♀ 17.vii.37.

P. pilicornis (Curtis). *Crataegus*. ♂♂ 20.iv, 6.vi, 11.viii.46, 3.vi.50. ♂♀ bred vi.46 from larvae on *Crataegus*.

Hoplocampa crataegi (Klug). Larvae of this genus feed internally in fruits. Abundant annually at *Crataegus* flowers May/June.

H. pectoralis C. G. Thomson. Common at *Crataegus* flowers, but less abundant than the preceding.

H. flava (L.). 3 ♀♀ 15.iv, 1.v.49 at blackthorn flowers. This species is sometimes a pest of cultivated plums.

H. chrysorrhoea (Klug). ♂♂♀♀ abundant annually at blackthorn flowers, especially in half shade.

H. rutilicornis (Klug). ♀♀ 15.iv.49, ♂ 8.iv.50 at blackthorn. Less common than the preceding.

Hemichroa crocea (Geoffroy). Gregarious larvae sometimes abundant on *Betula*.

H. australis (Lep.). ♀♀ 2.vi.46, 13.viii.50. 3 ♀♀ bred v.51 from larvae on *Betula*. The larvae make characteristic "keyholes" in leaves of *Alnus* and *Betula*.

Dineura stilata (Klug). *Crataegus*. ♀ 2.vi.46.

Pristiphora monogyniae (Hartig). *Prunus spinosa* L. ♀♀ 14.iv.46, 25.iv.48 swept from blackthorn.

P. moesta (Zaddach). Colonial larvae abundant on three trees of crab-apple, *Malus pumila* Mill., growing in the shade of trees, S.E. Wood and E. Plain, 1946-48. By 1948 the few remaining colonies of larvae were attended by a swarm of hymenopterous parasites, and the species was not seen after that year.

P. ruficornis (Olivier). Not uncommon on aspen and sallow April/July. ♀ bred v.51 from undescribed larva on *Betula*.

P. biscalis (Forster). *Prunus spinosa* L. ♀ 12.v.46.

P. punctifrons (C. G. Thomson). *Rosa*. 6 ♀♀ April/May.

P. alpestris (Konow). ♀ bred 7.iv.48 from larva on *Betula*, det. R. B. Benson. ♀ 14.iv.46, det. R. B. Benson.

P. quercus (Hartig). *Vaccinium* and *Betula*. ♀ 24.v.53.

P. testacea (Jurine). ♀ bred 30.viii.50; 5 ♂♂ 5 ♀♀ bred v.51 from larvae on *Betula*. Gregarious larvae sometimes abundant on *Betula* in shady places.

Amauronematus longiserra (C. G. Thomson). Species of this genus are early spring insects, mostly to be found at the opening buds of *Salix* spp. on which the larvae of most species feed. ♀ 31.iii.46 det. R. B. Benson. Common annually at *Salix* round ponds and hollows.

A. histrio (Lep.). Fairly common at *Salix* March/April.

A. amplus Konow. 5 ♀♀ bred iv.48 from larvae on *Betula* coll. 11.v.47. ♀ bred 10.v.54.

A. viduatus (Zett.). Not uncommon at *Salix* March/April.

A. leucolaenus (Zaddach). 2 ♀♀ 28.iii.48 det. R. B. Benson. Not uncommon at *Salix* March/April.

A. amentorum (Förster). ♀♀ 6.iv.46, 12.iv.47, det. R. B. Benson. The larvae feed in the catkins of *Salix* spp.

A. puniceus (Christ). ♀♀ 18.v.47, Banks' Common, 24.v.53 S.E. Wood, on *Populus tremula* L., its food plant.

A. humeralis (Lep.). ♀♀ 6.iv.46, 13.iv.47, det. R. B. Benson. Common at *Salix* spp. March/April.

Euura atra (L.). Larvae in stem galls of *Salix* spp. 2 ♀♀ 14.v.50,

♀ 9.v.54. On *Salix fragilis* L., *S. atro-cinerea* Brot., Burkhill, 1946 (as *E. ater* Jurine).

E. mucronata (Hartig). Bud galls. On *S. capraea* L., *S. atro-cinerea* Brot., Burkhill, 1946 (as *E. saliceti* Fallén).

E. venusta (Zadd.). Galls in base of leaf-petiole. On *S. capraea* L., Burkhill, 1946, and *S. atro-cinerea* Brot., Niblett, 1941.

Pontania leucosticta (Hartig). Larvae in rolled leaf margins of rough-leaved *Salix* spp. ♀ 24.v.47.

P. bridgmanii (Cam.). Bean-shaped galls on rough-leaved *Salix* spp. On *Salix capraea* L., *S. atro-cinerea* Brot., Burkhill, 1946; Niblett, 1941.

P. proxima (Lep.). Bean-shaped galls, often pink, on smooth-leaved *Salix* spp. On *Salix fragilis* L., Burkhill, 1946; Niblett, 1941.

Croesus septentrionalis (L.). Gregarious larvae often conspicuous and abundant on *Betula*.

Nematus lucidus (Panzer). *Crataegus* etc. Not uncommon at *Crataegus* flowers April/May.

N. salicis (L.). ♀ 2.vi.46. Colonial larvae on *Salix* often abundant.

N. melanocephalus Hartig. *Salix* etc. ♀ 11.vii.54, E. Plain.

N. pavidus Lep. 5 ♀♀ bred 4.vi.48 from larvae on *Salix*, on which the gregarious larvae were abundant annually.

N. myosotidis Fallén. *Onobrychis*, *Trifolium*. 2 ♂♂ 2.vi.46, 12.vi.49; ♀ 13.viii.50 E. Hollow.

N. nigricornis Lep. ♀ bred 8.viii.54 from larvae on *Populus tremula* L. E. Plain.

N. crassus (Fallén). *Betula* etc. 2 ♂♂ 22/24.v.49; ♀♀ 16.vi.46, 29.v.49.

N. spiraeae Zadd. Larvae abundant on *Aruncus sylvester* (Kosl.) in garden of Hotel, July 1946; not seen there June 1949.

N. tibialis Newman. Larvae on *Robinia pseudacacia* L. in Hotel grounds 2.vi.49, from which ♂ 6 ♀♀ bred 1950.

N. viridescens Cameron. ♀♀ 5.v.46, 6.vi.49, 9.v.54. ♀ bred 25.iv.51 from larvae on *Betula*.

N. melanaspis Hartig. *Populus* etc. ♀ 11.vii.54 E. Plain.

N. hypoxanthus Förster. *Salix* etc. ♀ bred 1954 from larvae on *Betula*.

N. bergmanni Dahlbom. *Salix*. ♀♀ 9.vi.46, 11.vii.50, 24.v.53. Bred 6.vi.53 from larvae on *Betula*.

N. brevivalvis C. G. Thomson. *Betula*. ♀ 5.v.46.

N. oligospilus Förster. *Salix*. 2 ♂♂ 2.vi.46, 13.viii.50.

Pachynematus rumicis (Linné). *Rumex*. ♀ 24.v.47 det. R. B. Benson. ♀ 12.vi.49.

P. moerens (Förster). ♂ 24.v.47 det. R. B. Benson. ♂ 12.v.47 E. Plain.

P. kirbyi (Dahlbom). *Carex*. ♂♂ 22.v.49, 24.v.53.

P. xanthocarpus (Hartig). ♀ 3.vi.50.

Statement of Accounts for the

		GENERAL							
		1968							
		1967							
£	s.	d.	Receipts			£	s.	d.	
2,012	19	2	Subscriptions Current	...	...	2,056	7	7
15	15	0	Subscriptions Arrears	...	...	8	5	0
87	16	6	Subscriptions Advance	...	...	97	0	0
63	5	0	Entrance Fees	...	...	53	10	0
2,179	15	8				2,215	2	7	
137	8	11	Donations	...	...	18	11	6
70	0	10	Tax recovered from Deeds of Covenant	...	...	99	6	11
8	0	6	Interest on Investments	...	...	8	0	6
35	15	8	Westminster Bank Deposit Account Int.	...	...	44	7	11
26	1	10	Central Inst. Co. Interest on Reserves (excluding Premises Account)	...	...	27	15	10
14	13	9	Bird Film Receipts	...	...	22	10	6
			Sundries	...	...	3	3	8
102	0	0	Central Inst. Co. Interest on Premises Account (see Assets and Liabilities)	...	...		
140	3	4	Balance in Hand	...	...		
8	19	2	Excess of Payments over receipts	...	...	66	3	7
2,722	19	8				2,505	3	0	
PUBLICATIONS									
125	12	11	Sale of Publications	...	...	125	15	0
26	10	0	Advertisements	...	...	20	19	0
—	—	—	L.N. No. 46 Reprint Reserve (£55.8.3-£55.8.3)	...	...		
—	—	—	L.B.R. No. 31 Reserve (£550.0.0-£521.6.3)	...	...	28	13	9
1,635	11	7	Transfer from General Account	...	...	1,407	16	5
1,787	14	6				1,583	4	2	
Statement of Assets and									
Accumulated Fund									
Balance at Nov. 1, 1967	..	..	..	..	..	(8	19	2)
Ex. Exp. over Income	..	..	..	..	..	(66	3	7)
						(deficit)	(75	2	9)
Current Liabilities									
London Bird Report No. 32 Reserve	..	..	..	..	..	550	0	0
Printing of Rules	..	..	..	..	..	50	0	0
Plant Mapping Sch. Pub. and Research Fund	..	..	..	..	..	75	0	0
London Naturalist No. 47 Reprints	..	..	..	..	..	41	8	4
							716	8	4
Premises Fund									
Balance at Nov. 1, 1967	..	..	..	..	..	1,802	0	0
Add Interest for year	..	..	..	..	..	108	0	0
							1,910	0	0
Library Cataloguing Fund									
Balance at Nov. 1, 1967		200	0	0
Life Composition Account									
Balance at Nov. 1, 1967		400	0	0
Castell Research Centre Fund (Carnegie Scheme)									
Balance at Nov. 1, 1967	..	..	..	..	..	50	0	0
Transfer from General Account	..	..	..	..	..	75	0	0
							125	0	0
Ornithological Research Fund									
Balance at Nov. 1, 1967	..	..	..	..	..	204	5	11
Royalties	..	..	..	..	..	5	4	0
Interest	..	..	..	..	..	13	19	3
							223	9	2
Less Grant to Atlas Scheme.	..	..	..	..	..	50	0	0
							173	9	2
							3,449	14	9

Year ended 31st October, 1968

ACCOUNT

1967			Payments						1968		
£	s.	d.									d.
277	17	3	Hire of Halls	...	...	...	...	...	241	3	6
94	12	6	Sectional Expenses	...	...	...	...	...	107	8	1
41	6	6	Subscriptions to other Societies	...	...	...	...	...	42	6	6
63	7	9	Printing and Stationery	...	...	...	...	...	101	19	5
55	6	11	Library Expenses	...	...	...	...	...	26	2	4
—	—	—	Castell Research Centre	...	...	...	...	...	9	6	9
—	—	—	Council Expenses (Conservation Committee)	...	...	...	...	...	6	0	0
245	16	8	Honoraria	...	...	...	...	...	200	0	0
6	18	10	Covenant Ex.	...	...	...	...	...	—	16	6
26	4	10	Telephone	...	...	...	...	...	12	3	1
70	7	8	Postages	...	...	...	...	...	61	5	3
15	16	5	Sundries	...	...	...	...	...	42	11	6
—	—	—	Bird Film Payment	...	...	...	...	...	—	9	8
—	—	—	Purchase of Wooden Cabinet	...	...	...	...	...	15	8	0
—	—	—	Calling of Special General Meeting	...	...	...	...	...	16	9	0
—	—	—	Refund of subscriptions credited in error by Bank	...	...	...	...	...	13	17	0
1,635	11	7	Grant to Publications Account	...	...	...	...	...	1,407	16	5
37	12	9	Rules Expenses	...	...	...	...	...	—	—	—
2,570	19	8							2,305	3	0
50	0	0	Reserve for Castell Research Centre (Carnegie)	...	...	...	...	...	75	0	0
—	—	—	Reserve for Plant Mapping Scheme Publication and Research Fund	...	...	...	...	...	75	0	0
—	—	—	Reserve for Printing Rules	...	...	...	...	...	50	0	0
102	0	0	Transfer to Premises Account (Interest) (see Assets and Liabilities)	...	...	...	...	...	—	—	—
2,722	19	8							2,505	3	0
—	—	—							—	—	—

ACCOUNT

177	1	0	Programme	...	...	...	...	...	261	9	6
55	8	3	London Naturalist Reserve for Reprints	...	...	...	...	...	41	8	4
816	4	4	London Naturalist No. 47	...	...	...	...	...	590	19	10
550	0	0	London Bird Report No. 32 Reserve	...	...	...	...	...	550	0	0
51	18	0	Addressing and Wrapping	...	...	...	...	...	41	6	0
91	12	8	Postages	...	...	...	...	...	98	0	6
45	10	3	London Bird Report excess Expenditure over Reserve	...	...	...	...	...	—	—	—
1,787	14	6							1,583	4	2
—	—	—							—	—	—

Liabilities at October 31st, 1968

Investments

£75	34%	War Stock at cost	...	...	...	...	...	75	0	0
£180	3%	Savings Bonds at cost	...	...	...	...	...	154	4	6
									229	4	6

Current Assets

Bank Balances											
Current Account	...	...	...	...	...	...	...	72	9	1	
Deposit Account	748	9	2	
									820	18	3

Deposit with Central Investment Co.	2,399	12	0
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Audited and found correct,
November 12, 1968.

A. J. BARRETT, Hon. Treasurer
R. W. HALE, Hon. Auditor
H. B. CAMPLIN, Hon. Auditor.

3,449 14 9

Conservation Report 1967 and 1968

By DAPHNE C. HERSEY

THE two years 1967 and 1968 saw several new developments in the realm of nature conservation, both in London and in the country as a whole. The first free period of registration of Common Land which commenced in January 1967 is now over, and it is to be hoped that most of the large commons are registered or in process of registration. Public registration finishes in December 1969 although County Councils may register land for a further six months after this. The 1965 Commons Registration Act provides that all common land, town and village greens in England and Wales and all rights over such land *must be registered* or the land will cease to be common. It is, therefore, the responsibility of all naturalists to see that no important natural history sites are missed. Because the safeguarding of the land is so important, in October 1967 the Conservation Committee invited Dr. Brenda Swann, Research Secretary of the Central Committee on Commons Registration to speak to us and others interested.

To extend practical knowledge of conservation, a weekend course was held in May 1967 at the Haslemere Museum, this being organised by the University of London with the co-operation of L.N.H.S. As in the previous year, the director was Dr. Palmer Newbould. The preparation and implementation of a management plan was discussed with special reference to Old Winchester Hill National Nature Reserve which was visited on the Saturday. A skeleton management plan was drawn up for a small area of woodland near the Museum, assuming for the purpose of the exercise that it was a nature reserve.

In April 1968, the Greater London Council, with the London Boroughs Association, sponsored a conference on the River Thames, which influences so much of London's natural history. Our representative at this conference was Mrs. Small, who with Mr. Lucas of the Surrey Naturalists Trust, was representing natural history interests which tended to be rather overlooked in the talk of Thames barrage versus dam which made the headlines. Mrs. Small pointed out to those present that from one end of the river to the other the conservation of nature was a vital consideration. Even the marshes downstream which to many of the delegates appeared dull and uninteresting were to the naturalist the remains of a fast disappearing habitat of unparalleled interest and value. Following this conference, Mrs. Small was asked to prepare a list of Thameside sites worthy of conservation.

Other conferences were held during 1968 by organisations which have the conservation of the countryside at heart, and amongst those to which our representatives were invited have been the Ministry of Housing and Local Government Conference on woodlands in Essex and Hertfordshire, convened by Mr. Arthur Skeffington, M.P., the conference for Natural History Societies at Monks Wood Experimental Station, the biennial S.P.N.R. conference at Canterbury, the Surrey Trusts meeting at Juniper Hall, and the annual meeting of member bodies of the South-Eastern section of the Council for Nature.

Conservation in London can only be achieved with the co-operation of all interested in preserving our local countryside. We were therefore

very pleased to invite and welcome to our Committee an observer for the Nature Conservancy and a representative of the Berkshire, Buckinghamshire and Oxfordshire Trust to join those already representing Essex, Hertfordshire, Kent, Middlesex and Surrey. Geological interests are also well represented.

Wimbledon Common has been an example of the way in which various societies can work together for the common good. In her speech to the delegates at the Thames Conference, Mrs. Small said "Landscaping is a dreadful word to naturalists as it usually means the destruction of all that is natural and native". This thought has been behind the opposition by this Society, together with the Surrey Trust, the Putney Society, the John Evelyn Society, the Commons Society and the Nature Conservancy to the report on Putney Heath and Wimbledon Common compiled by the G.L.C. landscape architect. Mr. Milne-Redhead, Chairman of the Conservation Committee, has made a detailed criticism of this report which pays no attention to the considerable natural history of the Common, the Landscape Architect being apparently unaware that it is a Site of Special Scientific Interest. This Committee, together with the other bodies, is continuing to put pressure on the Conservators to remove the unsightly dumps containing a mixture of sterile London Clay excavated from roadworks at Tibbet's Corner and general household rubbish, which from October 1967 have covered ten acres of acid grassland on plateau gravel.

If the conservation movement is to prosper—and it is essential for our countryside that it should—it is necessary to seek the co-operation not only of other amenity bodies but of local Councils and members of the general public. There have been many instances of such co-operation during the past two years.

As mentioned earlier, the Clerk to the G.L.C. has been notified of the most important Thameside sites for nature conservation. These include the Hampton Court Home Park and towing path, Ham riverside lands, Kingston to Twickenham riverside path, the Old Deer Park, towpath and stream at Kew, Syon Park and its adjoining marshy land, Isleworth Eyot, Barn Elms Reservoirs, Barnes Footbridge snail site, and the marshes of the estuarine reaches, particularly Rainham and Aveley.

In 1967, names and details of all known sites of natural history importance were sent by the Trusts to the Parks Department of the Greater London Council. More recently, Mrs. Small, our Vice-Chairman, and Mr. Laburn of the Nature Conservancy discussed with two officers of the Parks Department the question of infilling with hardcore at Hampstead Heath.

As a result of a report from a member of the Committee to the effect that exotic conifers were being planted in Highgate Wood, the Corporation of the City of London was informed of the Committee's concern that as far as possible the wood should be maintained in its natural state as one of the few examples in our area of a gravel ridge Oak-Hornbeam community and where re-planting is necessary, the same native species should be used. In consequence the re-planting programme was halted and our Chairman had a most satisfactory meeting at the site with the Superintendent concerned.

Following representations made to the Surrey Trust, the Committee was asked to investigate scrub clearance at Riddlesdown. Mr. R. Clarke met the Superintendent of Commons appointed by the Corporation of the City of London and advised him of the areas of botanical interest. A programme of clearance and management at Riddlesdown was agreed to the satisfaction of both parties.

Banstead Urban District Council has been persuaded by the Surrey Trust to make Banstead Woods a Nature Reserve. Bromley Borough Council had a scheme to appoint a Conservation Officer, although unfortunately this did not come to fruition owing to lack of funds. The Kent Trust has informed Bexley Council of interesting scientific sites in their area, and the Council will notify the Trust representative of any developments affecting these sites.

Earlier in 1968, the Nature Conservancy was approached by the Ruislip Residents' Association about the state of Ruislip Woods—Copse, Park, Mad Bess, and Bayhurst. Three specific complaints were made—the general degeneration due to lack of coppicing of the Hornbeam, the road widening on Duck's Hill where drainage was diverted into a stream in Copse Wood, and a proposed reduction in the number of rangers. The Nature Conservancy asked the advice of the Herts./Middlesex Trust and the matter was discussed with the Residents Association and the local Natural History Society.

Members of the Committee have been contacted by many people anxious about such matters as tree felling, clearing of scrub, spraying, and management of small nature reserves. The owners of a house at Warlingham have established a private reserve in its grounds. At Shepperton the successful opposition to proposed building development led to increased public interest in Natural History, and it is hoped that the gravel pit there will become a nature reserve.

Schools have an important part to play in the conservation movement and some I.L.E.A. inspectors and Biology teachers have visited Bookham Common, Ruxley Gravel Pit and other sites to discuss their suitability for field work. Ruxley Gravel Pit has been visited by pupils from Peckham Comprehensive School, and at Godstone Reserve the Surrey Trust is working closely with two schools. The Field Studies Facilities Committee has compiled a Conservation Code containing notes on access to land for field studies and this was extensively discussed by our Committee during September 1967.

The observer of the Surrey Bird Club telephoned our Chairman to inform him that hawthorn and scrub were being removed near the Herony in Kempton Park in contravention of the agreement already reached regarding the cessation of work nearby during the heron breeding season. The Manager, when contacted, had the work stopped immediately, but the Herons had been considerably disturbed as whilst they were off the nests their eggs had been taken by Carrion Crows. It was feared that their breeding would have been adversely affected, but fortunately this has not proved to be the case as it was sufficiently early in the season for the birds to lay again.

On Wednesday March 8, 1967, a meeting of Trusts was held to which the L.N.H.S. sent a representative, the purpose of the meeting being to

obtain a general agreement on the main principles to be followed in plans for the conservation of gravel pits. North Surrey Gravel Pits on both sides of the Thames and the Colne Valley Regional Park, including Black Park, Langley Park, and the area from the Thames to Rickmansworth, were amongst sites discussed as meriting special consideration, and a report was presented through the Nature Conservancy to Hillingdon Council. Perhaps the most unusual conservation news of the year referred to this area. Peat samples taken from the Colne Valley were analysed at the Institute of Archaeology and discovered to be Boreal in date, rare in Southern England. It is hoped that a sample of these peat areas can be preserved and set aside for research purposes.

The meeting agreed, as part of regional policy, that the prime need is to provide sites for waterfowl roosting and breeding areas and to keep these sites free from disturbance, the pits with the best waterfowl populations forming a nucleus from which sanctuary sites could be chosen. It was agreed that suitable landscaping and management would enhance the value of sites. It is hoped that a policy for gravel pits will be agreed *nationally* with definite conservation aims of top soil replaced correctly and sand spits preserved.

Information on water areas including Metropolitan Water Board reservoirs in the L.N.H.S. region was supplied at their request to the Nature Conservancy.

Naturalists and anglers often show interest in the same stretches of water. We were sorry to receive a letter from the Royal Society for the Protection of Birds about the numbers of birds being killed by discarded nylon line, particularly in the area of Wandsworth Common ponds. Mrs. Small suggested that a notice should be put there stressing the dangers of discarded line, and this has now been done.

The Committee felt that the policy of the Metropolitan Water Board regarding chlorination of streams in the London Area needed a certain amount of clarification and accordingly the Secretary was instructed to write to the Clerk of the Board. This produced a most helpful reply to the effect that chlorination is avoided whenever possible and is generally opposed, both by the River Authorities and the water undertakings.

So much of interest in the London Area is being whittled away, especially by road building, that the siting of new roads and laying of pipe lines are both matters that concern the conservationist. A great deal of Scratch Wood has been taken up by the development of a spur road from the M1 motorway, and we are shortly to lose part of Oxleas Wood to the new "C" Ring Motorway. Our Chairman visited the screening bank being constructed on the site of Old Windmill Lane to the east of Osterley Park and suggested that this bank should be planted with native trees and shrubs useful to birds and its steep slope of 1 in 2 be reduced. The new gas pipe line from Fulmer, Buckinghamshire, to Mill Hill being laid via Poor's Field does not affect any Site of Special Scientific Interest and that at Mitcham Common does not appear to have an adverse influence on natural history interests.

Vandalism is another problem. In 1967, sixteen Longworth Mammal traps were stolen from Bayhurst Wood, Hertfordshire, and Ruxley Gravel Pit has long suffered from malicious damage. At the time of writing, helped by court cases concerning the possession of fire arms and

shooting on reservation land, this is decreasing, an additional help being the erection of a chestnut fence along the A20 verge which has necessitated the removal of most of the gypsy caravans.

As well as setbacks, there have been triumphs for conservation over the course of these two years. Mention has already been made of the failure of the application by the brewers, Messrs. Courage, Barclay & Simmonds, to build houses on the green belt land adjoining the gravel pit behind the Bugle Public House, Shepperton. The offending clause in the Hainault Forest Bill whereby a camping site would have been established in an interesting Oak-Hornbeam community was withdrawn, as was the proposal for a similar site adjacent to Joyden's Wood, Kent.

Our support was asked for by Colonel Chappell, a Verderer of Epping Forest, in upholding the clause in the Corporation of the City of London Various Powers Bill which would enact that Forest land may not be compulsorily acquired from the Corporation without the authority of Parliament. This Bill which also affects a number of other areas was presented by a private Member of Parliament in July, 1967.

Very recently there has been some correspondence with the I.L.E.A. Geography Inspector and the Metropolitan Regional Examinations Board about the growing practice of "improving" C.S.E. examination Geography and Science files by inserting pressed flowers and leaves as examples of what can be seen in different types of habitat. We feel that this practice is to be deplored and that teachers of Geography and Science should give a lead in conservation matters. The Geography Panel have now agreed to include in their 1971 syllabus a note suggesting that in order to encourage a respect for the countryside, candidates should be discouraged from the indiscriminate collection of flowers and plants. The note will also draw attention to the "Outdoor Studies Code" published by the Field Studies Facilities Committee.

Considerable publicity was given to the proposal to transfer to local boroughs the commons and open spaces at present administered by the Greater London Council, this to be done under the terms of Section 58 of the 1963 Local Government Act. We, together with many other societies, including the Commons, Open Spaces and Footpaths Preservation Society, felt that such a step would be disastrous. The policy of the G.L.C. in conservation matters has been enlightened and we did not see how all borough councils could have the necessary *specialist* knowledge to administer the areas which they might acquire. We were particularly concerned with the fate of the larger parks and commons such as Hampstead Heath which under the terms of the Act could be administered by as many as three different boroughs, much to the detriment of the land. There was correspondence with the G.L.C. and the Commons, Open Spaces and Footpaths Preservation Society about this, and largely as a result of the pressure exerted on the G.L.C. by the various voluntary amenity societies, the G.L.C. now propose to retain the major London parks and commons.

Future developments in our area may be many. We hope that all members of this Society will be vigilant and let members of the Conservation Committee know at once if land of scientific interest is threatened by new developments, so we can act *at once* and not let matters drift until it is too late to take effective action.

Books

The History of British Vegetation, by Winifred Pennington. 152 pages, 30 photographs, 32 diagrams and maps. English Universities Press, 1969. Unibook Edition (paperback) 28s.; Hardback edition 45s.

It is now some thirty years since the techniques of pollen analysis were first introduced into this country, and in the intervening years our knowledge of the history of the British flora has made considerable progress from those tentative beginnings. The subject is in itself a fascinating one, and closer to the interests of the field naturalist than some might suppose—for instance, the survival of the post-glacial communities of Upper Teesdale, something which can be explained only in terms of vegetation history, is a matter which has, in recent years, aroused strong interest, and even emotions, amongst naturalists and conservationists throughout the country.

Hitherto the history of our vegetation has been available to the reader only through such major works as Godwin's *History of the British Flora* or in scientific papers which have appeared in a wide range of journals published both here and abroad. Now, Winifred Pennington has summarised our present knowledge and brought it together in this brief, lucid and well-illustrated volume.

The past vegetation history of a region is a matter of interest to more than botanists, for it is one of those subjects which inconveniently cuts across the frontiers of several disciplines and makes a mockery of the divisions into which we fragment knowledge. To the archaeologist, biologist, geographer, historian, or to anyone who has an interest in the development of our environment, this is a book which can be thoroughly recommended.

PAUL A. MOXEY

Britain's Green Mantle, Past, Present and Future, by A. G. Tansley. Second edition, revised by M. C. F. Proctor. 327 pages, 72 plates with 140 black and white photographs, 12 line drawings. Allen and Unwin, London, 1968. 50s.

It is now twenty years since *Britain's Green Mantle* was first published, a period during which many changes have taken place in the countryside. M. C. F. Proctor, in his revision of the first edition, has taken into account these changes and incorporated them into the book, together with the recent advances in our knowledge of the vegetation of the British Isles. It is a great pity that many of the plates from the first edition were not available for the second; however, the quality of the illustrations is excellent, with many of them being supplied by Dr. Proctor from his own collection.

The first two chapters provide the background of the book by piecing together the evidence for the vegetation pattern of the past, from the Ice Age to the present day. Methods of dating palaeo-botanical evidence and the role of palynology in the reconstruction of the past vegetation make this historical section a fine opening to the book. Two of the more important factors affecting plant distribution, climate and soil, are admirably treated in chapter three.

The major part of the book is devoted to a general account of the main plant communities, with at least one chapter on each. Within each account the structure, geography and environmental factors affecting the community are described. However, there are no long lists of scientific names, only those which are the characteristic species of a particular community being enumerated. In a short chapter preceding the general description, the ecological hierarchy of communities and their succession is explained in a simple but comprehensive manner.

Man has affected the natural vegetation of this country since Neolithic times and will continue to do so. In the final chapter, Dr. Proctor outlines the prospects for the vegetation under Man's influence and discusses the question of conservation.

This book is of great value to students of ecology, to naturalists, and to anyone who has an interest in the vegetation of the British Isles.

K. A. J. GOLD

British Sedges, by A. C. Jermy and T. G. Tutin. 199 pages, 32 + 69 figures. Botanical Society of the British Isles, 1968. 17s. 6d.

This is the first of several handbooks that the Society hopes to publish on "difficult" genera or groups. It is modelled on the excellent *Grasses* by C. E. Hubbard, published in 1954 which has been an outstanding success. Professor Tutin was responsible for *Carex* in *C.T.W.*, and Mr. Jermy of the British Museum (Natural History) has specialised on the genus so we have the collaboration of two experts supplemented by the drawings of three lady artists.

An introductory chapter is devoted to the general structure of a sedge plant, and there is a note on classification together with some habitat lists. Two keys occupy 30 pages, one being to fruiting plants and the other a key using vegetative characters to *Carex* and allied sedge-like plants.

There are 75 British species of *Carex* described and in most cases the illustration occupies the page opposite to the descriptive text. Some allied plants are depicted two to a page. Each species is succinctly described with the habitat, ecology and a brief indication of the distribution following. Reference is made to the hybrids between our species that have been recorded in the British Isles. Occasionally some non-British, but European species are mentioned. Some of the interesting field observations on species do not seem to have hitherto been included in our standard floras. We read that *Carex buxbaumii* dies back completely leaving little signs of its presence by the end of August, and that the leaves of *Carex lepidocarpa* do not over-winter, whilst those of *C. demissa* frequently do, and this the reviewer can confirm. We all have noticed how conspicuous *Carex pendula* is throughout the year.

The illustrations are generally excellent, especially those of *C. demissa*, *C. humilis*, *C. acuta*, *C. rupestris*, *C. divisa* and *C. chordorrhiza*. These are all species one per page, but some others call for comment. *C. laevigata* is a more robust plant with longer spikes than the figure suggests. *C. hostiana* is shown with three female spikes, the description says 1 or 2, and this is the general rule. If there are three female spikes on a plant, and this is very seldom, then the third is usually well down below from the other two. In some cases justice is not done to one of the two species

sharing a page. *C. arenaria* is instantly recognised (fig. 57) but this cannot be said of *C. paniculata* and *C. appropinquata* (figs. 51-52).

On figs. 54-55 the spike of *C. vulpina* should have been drawn to contrast it with *C. otrubae* as it is, when well developed, strikingly distinct from the latter. On fig. 54 the plant A does not suggest *C. otrubae* at all, on fig. 67A *C. curta* is rather a weak specimen, and on fig. 69 the spikes of *C. ovalis* are usually more robust than is shown. It is unfortunate that *C. muricata* and *C. spicata* share a plate, as these two species and sub-species *leersii* frequently give trouble in correct identification. There are too, plants occurring in Yorkshire and Scotland not yet satisfactorily identified.

If beginners study *Carex* plants firstly with mature spikes before they attempt to determine plants only just in flower, they will find this handbook invaluable. It is good value for the price and should be in every botanist's library.

E. C. WALLACE

The Flora of Berkshire, by H. J. M. Bowen, with accounts of the Bryophytes edited by E. W. Jones, and of the Fungi edited by F. B. Hora. 389 pages. Holywell Press, Oxford, 1968.

George Claridge Druce's *Flora of Berkshire* was published in 1897 and a Supplement was printed in 1919. A revision of the recorded flora of this delightful southern county was, therefore, long overdue, and Dr. Bowen is to be congratulated on producing a work on the lines of the traditional county flora.

Short, but adequate accounts are given of the geology, soil and climate of Berkshire, and details of plant records from the Quaternary period and of existing plant communities are provided. The chapter on the botanical investigation of the county is disappointing. Druce devoted 90 pages of his *Flora* to detailed biographical accounts of the many famous British botanists who had contributed to the knowledge of the botany of the county. Dr. Bowen, who had to consider space and print very carefully in order to keep his book to an economic size, confines his account to a mere page and a half, headed "Some Distinguished Berkshire Botanists"—here, short biographies are given of G. C. Druce, H. W. Monckton, A. B. Jackson and E. F. Warburg.

The *Flora* treats not only vascular plants but also Charophytes, Lichens, Bryophytes and Fungi. The vascular plants are dealt with in the time honoured method of British local Floras—under each species are placed details of status, habitat and frequency, together with ecological data, which are followed by citations of the localities in which the plant has occurred. The inclusion of dates following records, so often omitted in modern Floras, is a useful feature, and one which should be followed by all writers of local floras.

The main criticism on the species included is on the large number of planted trees and shrubs, not known to regenerate, which are given, e.g. *Sequoia wellingtoniana* Seam., *S. sempervirens* (Lamb.) Endl., *Metasequoia glyptostroboides* Hu and Cheng, *Taxodium distichum* Rich., *Sciadopitys verticillata* Sieb. and Zuce., etc., but better too much than too little, and the inclusion of planted trees and garden plants is standard practice in some Continental Floras.

The 56 pages of distribution maps could I feel have been pruned. The maps are on a very small scale, and for many species an English county is too small a unit for a distribution map to show a significant distribution pattern other than frequency or infrequency.

The meat of the book, however, is in the text, and here Dr. Bowen has reached a very high standard. The new *Flora of Berkshire* is likely to remain the standard work on the county for many years to come.

DOUGLAS H. KENT

Rocky Mountain Trees, by R. J. Preston, Jr., third edition, revised. 285 + lxxx pages, 129 plates + 3 text figures. Dover Publications, 1968. 26s. 6d.

This pocket-sized book gives a complete guide to the trees of the region lying between the Great Plains and the Pacific Coast States. The area covered includes sub-tropical desert and alpine scrub so the range of species is far greater than in Britain.

Many familiar genera, such as pines, oaks, ash and maples are represented and keys to genera and species make identification simple. A number of trees native to this region are cultivated in the British Isles and it is of interest to learn their natural range and habitat and to discover their growth characteristics in their native haunts.

There is an useful introduction to the life zones of the region and an account of tree anatomy, which enables the reader to follow the keys and detailed descriptions. Check lists of species for each State make the book valuable for the North American botanist or forester but are of little interest to us.

All native species are illustrated in detail and have a full page description and useful range maps are provided. Similar and introduced species are mentioned in brief and are included in the keys.

The only criticism that can be levelled at this very useful manual is that the plates have been darkened in the process of enlarging them from the second edition. This is most serious in the conifers which often have the detail obscured.

For those lucky enough to visit the Rockies this guide will be indispensable but it is also of general use to those who need a simple account of the vegetation of this large and important region.

BRUCE ING

The Sea-Beach at Ebb Tide, by Augusta Foote Arnold. Dover Publications Inc., New York, 1968. 33s. 6d.

This book says on the cover that it is a guide to the study of the seaweeds and the lower animal life found between tide-marks. One has to read the preface to find that it refers to the North American beaches.

An unabridged and unaltered republication of a work originally published in 1901, it has a very limited practical value to the naturalist collecting on British shores, to whom it will be misleading.

It is obvious that there would be many basic similarities between American species and our own, especially on the Atlantic Coast, but equally obviously the differences are so sufficiently marked as to warrant

different names. In addition some names, probably used in America in 1901, are retained; an example being the Starfish *Crossaster papposus* which is our English species *Solaster p.* and among the hydroids few of those described are to be found in British littoral waters.

There are also descriptions of species never found on our beaches, of which the sand-dollar (*Echinarachnius parma*) is an example "common objects on sea-beaches from New Jersey northward".

Perhaps not surprisingly, the plates are generally poor, in particular those of the smaller sea-weeds. Some of the line drawings are excellent, but these do not save the book, which is not a wise buy for anybody aiming to do work on our shores.

A handbook to American shores can, other than to the expert, find little sale in this country, and perhaps, at 68 years old, it is more a "collector's piece" than a working manual even in its country of origin.

R. C. VERNON

The Pocket Encyclopaedia of Plant Galls in Colour, by Arnold Darlington and illustrated by M. J. D. Hiron. 191 pages. Blandford Press, 1968. 25s.

This book is the first on the subject to be published in Great Britain since the appearance in 1912 of E. W. Swanton's *British Plant Galls*. "Swanton" was the handbook of most of the members of the old Plant Gall Section when it was founded in 1917 and was undoubtedly a stimulus for research, although almost from the start some members realised its inadequacy and errors and turned to more serious continental books by Houard and Ross-Hedicke. Will the present book be as stimulating to a new generation of naturalists? I think so in spite of some reservations.

The layout of the book is in three parts; an introductory section, then a block of eighty pages of illustrations and finally descriptions of "representative" British galls. The introductory chapters are informative. The value of the illustrations varies. Most of the photographs are good, but in one or two (as in no. 58) the detail of the gall is lost in the dark background. The water colour drawings, though simple, are useful. The descriptions of less than two hundred of a possible total of two thousand British galls are arranged to follow the order of plant families shown in the "Flora" of Clapham, Tutin and Warburg instead of the more convenient alphabetical order of plant genera as used in the recent continental works of Doctors van Leeuwen and Herbert Buhr. The nomenclature, except in the case of eelworm galls, is generally up to date.

In the author's selection of representative galls is included a new one on *Hedera helix* L., var. *cristata* but he omits that of the mite complex of *Eriophyes triradiatus* etc. which is conspicuous on willows in our area. Darlington also accepts, which few cecidologists have been prepared to do in the past, the leaf mines of *Phytomyza ilicis* Curtis, on holly as galls. Sometimes his brevity may lead to misunderstanding. For instance he is only partly correct when he states that the causes (*Andricus kollari*) leave their marble galls on oak in September-October. A proportion do so in the first year but many do not leave until the following year. He also seems to doubt that the form *circulans* on *Quercus cerris* is the sexual generation of *A. kollari* which galls *Q. robur* and *Q. petraea*. Although

naturalists have wondered about this ever since Beijerinck first suggested it in 1897 surely the careful experiments of E. M. Marsden Jones have proved the relationship of the two forms beyond doubt.

A declared purpose of the book is to suggest investigations which can be carried out in the field, the laboratory or at home, into the biology of galls. I would like to emphasize one suggestion—the study of *Chirosia* spp. (Diptera: Muscidae) that mine and gall the fronds of ferns—and to make another. On my last visit to my friend Montagu Niblett before his death he told me that the galls of the Turkey Oak would repay investigation. On the continent a large number of Cynipid and Cecidomyiid galls have been recorded on this tree but very few in Great Britain. Here is an important field of study.

Altogether the book is an excellent introduction, at a reasonable price, to a somewhat neglected subject.

A. E. LE GROS

The Oxford Book of Insects. Text by John Burton with I. H. H. Yarrow, A. A. Allen, L. Parmenter and I. Lansbury. Illustrations by Joyce Bee, Derek Whiteley and Peter Parks. 208 + viii pages, 96 full page colour plates + 9 text figs. Oxford University Press, 1968. 50s.

Introductory books to stimulate interest in the study of insects are always difficult to write and even more difficult to review. The present work is a collaboration between entomologists and artists, some of whom are members of our Society. It follows the tradition of "Oxford Books" in providing large coloured plates with relevant text opposite.

To criticise choice of species illustrated is easy as this is such a personal matter and I think that the writers have generally been very successful in this respect. In the smaller Orders, however, more stress might have been made on the difficulties of identification, and that this book does not permit this beyond, perhaps, the family. The text is good—interesting, informative, crisply written and edited.

The main criticism lies in certain of the plates, especially those depicting minute insects. In general the illustrations are very good, the Lepidoptera especially being among the best available anywhere near this price. But on pages 33-39 (Homoptera, Neuropteroids, Trichoptera) and 125-141 (Diptera) the insects presented are so small and "fuzzy" in relation to their background that the pictures are nearly useless. The bee chafer on page 183 is far too red and the *Dorcus* on the same page is rather clumsily drawn. On page 191 the *Stylops* could be any species so that giving it a specific epithet is a little pretentious. The female (fig. 12) should be yellowish-brown, not white. It is perhaps invidious to remark that most of these criticised plates are drawn by one artist, but it must be stated that they are by far the least successful.

Brief sections on classification, anatomy, metamorphosis and protective colouration are probably adequate for a book of this sort but the bibliography is hopelessly short and could easily be improved to make it of real value to the beginner. The blurb on the dust jacket also promises sections on migration and social behaviour but these have not materialised. An index completes a book that is well produced with few obvious printing

or other errors. It is a pity that the cost of books in this series has "escalated" but this welcome addition is recommended to the non-entomologist who may well be stimulated to be "bitten by the bug" himself.

BRUCE ING

The Library

WORK on the classification of the Library has continued and, despite many difficulties, has been completed. Compilation of a catalogue can now be commenced.

Since the Society has housed the Library at Ealing Central Library, we have received much valuable help from Dr. Toufar. Indeed, when the Library first transferred to Ealing, the Library was contained in a collection of boxes and its present well ordered state reflects the assistance received from Dr. Toufar and his staff. Extra warm thanks and good wishes are due to Dr. Toufar on his retirement this January.

Books recently added to the Library include:—

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Sage, B. L. *Northaw Great Wood*. 1966.

Scheithauer, W. *Humming Birds*. 1967.

Scott, T. and A. *The British Parasitic Copepoda*. Vols. 1 and 2. 1913.

Tutin, T. G. and others. *Flora Europaea*. Vols. 1 and 2. 1965/1968.

Usher, G. *A Dictionary of Botany*. 1966.

Willis, J. *A Dictionary of the Flowering Plants and Ferns*. 1967.

Books reviewed in London Naturalist and London Bird Report are also included in the Library and are not listed here.

Since the list of periodicals was published in 1967, some of the gaps in the Society's runs of journals have been filled. Many still remain and the Librarian would gratefully receive any natural history journals discarded by Members. The reports of regional natural history societies would be particularly acceptable, as these are most difficult to obtain when out of print. It is hoped that an amended list of the periodicals in the Society's Library will appear as part of the catalogue.

INSTRUCTIONS FOR CONTRIBUTORS

Contributors are asked to study these notes with care, to save themselves and the Editor unnecessary work in the revision of manuscripts.

DATE OF SUBMISSION OF PAPERS

Papers should be submitted to the Editor (address in Programme) by the end of January and not later than the middle of February if they are to be considered for publication in the same year.

TEXT

Papers and short notes should be submitted in final fully corrected form. They should be typed, with double spacing and a wide margin, on one side of the paper only. Submission in duplicate is requested if possible, and authors are advised to retain a second copy for their own reference purposes. The total number of words should be pencilled at the head of the paper.

FOOTNOTES

Footnotes should be avoided wherever possible, but may be used for brief notes which cannot be fitted conveniently into the text. They should be inserted in the typescript immediately below the line to which they refer.

SCIENTIFIC NAMES

Scientific names should be underlined, and the authority upon which they are based should be cited. Where English names of species are employed, it is suggested that a capital letter be used for the beginning of the name, e.g. Badger.

REFERENCES

References should be listed at the end of the paper, in alphabetical order of authors' names, in the following standard form:

MATTHEWS, L. HARRISON (1952). *British Mammals*. London.

YOUNG, G. W. (1905). The Chalk Area of North-East Surrey. *Proc. Geol. Assoc.*, 19, 196-206.

The corresponding references in the text would be (Matthews, 1952) and (Young, 1905).

As far as possible, titles of journals should be abbreviated according to the latest (4th) edition of the *World List of Scientific Periodicals*. Authors who require guidance on this point should consult the Editor.

DATES

These should be in the form June 9, 1964.

ILLUSTRATIONS

Line drawings should be submitted separately, in Indian ink on thick white paper or card, preferably 2x or 3x the size finally intended. Graphs should be drawn on paper preferably ruled in blue or faint grey. Legends should be typed separately, as they will be set up by the printer. The use of stencils or self-adhesive lettering is strongly recommended for place-names etc. on maps.

The Editor should be consulted in good time if there is any doubt about the preparation of illustrations. Photographs can be accepted only after prior consultation.

PROOFS

Galley proofs will be sent to authors for scrutiny, but only essential corrections can be made at that stage.

OFFPRINTS

Up to 25 free offprints will be supplied on request. Additional copies may be purchased if an order is made when the proofs are returned.

